SIXTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

NEW YORK.

TRANSMITTED TO THE LEGISLATURE MARCH 19, 1886.

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MEMBERS OF THE BOARD.

State Commissioners of Health; appointed by the Governor and Senate.

ERASTUS BROOKS, West New Brighton, Richmond county.
J. SAVAGE DELAVAN, M. D., Albany. *
GEORGE W. COOKE, M. D., Kingston.

Appointed by the Governor from the Health Commissioners in Cities.

EDWARD M. MOORE, M. D., Rochester.
WOOLSEY JOHNSON, M. D., New York.
ALFRED MERCER, M. D., Syracuse.

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WM. M. SMITH, M. D., Health Officer of N. Y. Quarantine, S. Island.
JAMES T. GARDINER, Superintendent of State Survey.
DENNIS O'BRIEN, Attorney-General.

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DR. ALFRED L. CARROLL, *Secretary,* New Brighton, Staten Island.
FREDERICK CARMAN, *Assistant Secretary.*

State Superintendent of Registration and Vital Statistics.

DR. ALFRED L. CARROLL, as Secretary of the Board.

* Deceased.

STATE OF NEW YORK.

No. 83.

IN ASSEMBLY,

MARCH 19, 1886.

SIXTH ANNUAL

REPORT OF THE STATE BOARD OF HEALTH.

STATE OF NEW YORK:

EXECUTIVE CHAMBER,
ALBANY, *March* 18, 1886.

To the Legislature:

I have the honor to transmit herewith the Sixth Annual Report of the State Commissioners of Health, together with appendix and maps.

DAVID B. HILL

REPORT.

To the Hon. DAVID B. HILL, *Governor of the State of New York:*

SIR — To secure the formation of local boards of health and to aid them in the work of protecting the lives and health of the citizens in their respective localities has always been held as a work of primary importance by the State Board of Health. During the past year a large number of new boards of health have been formed, but the increase in number is even of less importance than the improvement in their working power, due to the gradual perfection of the law under which they work.

As defects in this law became apparent, recommendations have been made to the Legislature for amendments. The law of its action as well of the being of the State Board of Health was passed in 1880. The board then formed was in many respects an entirely new organization, and so also was the general system of health machinery. A State system of registration of births, deaths and marriages had previously existed under the general supervision of the Secretary of State, and to this established but desultorily performed work, the State Board succeeded as far as its supervision related, a central bureau of registration being added. But this general plan was not only new to the State but largely original as a system. Its general plan was most admirable. Prior to its adoption the system had been followed of caring for the public health by local laws, conferring on officers of counties, cities, villages, and towns authority in their respective localities. The new system, not deviating widely from what had become established usage, retained the executive powers with the localities, suppressing even the authority of counties, and recognizing only towns, cities and villages, and combining them all through the medium of one central board which should stimulate them to action, be advisory resource, and in case of the last necessity, only by mandatory action.

As might have been anticipated, points of weakness and ambi-

guity in the law were developed in the experience of its operation, and in 1885 a new law was prepared embodying all the salient features of the old, and introducing such new provisions as had been shown to be necessary both as regards the perfection of registration of vital statistics and as regards the sanitary powers of local boards. The efficiency of the work after the first year's trial demonstrated a decided increase in the necessity and value of the law of 1880, and its later amendments.

The increased activity of the local boards, as regards sanitary work, is felt in the larger demand upon the central office for advice and assistance. To render this is one of the important duties of the State Board. The personnel of the local boards is constantly changing, new elective officers taking the places of those before in service, and bringing persons unfamiliar with the duties of sanitary administration into office. There is consequently constant inquiry and correspondence regarding the routine of work and the most elementary questions of sanitary requirements. It is but natural that difficulties should constantly arise, and appeals be made to the State Board when necessary. This work of sanitary correspondence with the local boards, giving them the accumulated experience of the State Board in sanitary matters, has already become one of the most important features of the central sanitary service.

Besides questions that can be met by correspondence or personal advice, there are many which can only be answered by a local study of the conditions that may exist through representatives of the central board, who are special experts in the matter at fault. An important element in the sanitary machinery of the State is the force of sanitary inspectors, engineers and chemists which the central board requires to meet the frequent emergencies of educated investigation. This is the most economical way in which the State can supply to every locality the benefit of the best expert advice in matters affecting the public health. The reports of the different committees show how extensively this work has been done during the year. It would be a matter of economy, in the judgment of the Board, if this element of its work and the resources at its command were still further enlarged, as far as its assistance in chemical analysis is concerned. The central office needs at its command a well-furnished laboratory for the investigation of potable waters, foods, drugs, and in regard to which there is a steady call for advice.

The perfection of the State system of registration of vital statis-

tics is of importance scarcely second to that of the formation and instruction of local boards of health. The development of this work has required years of constant effort, and the registration is yet far from complete. Progress toward this work is, however, steady, and the committee on vital statistics report a large increase in the number of returns received over previous years. Every effort will be continued to make it uniform and thorough. It is already so perfect in many places as to form a reliable basis for the investigation of the causes of preventable disease.

The monthly bulletin presents a summary of the mortality of the State, including not only the returns that are received from the three millions of the population of the State that are under the Board's jurisdiction, but also of most of the large cities which are by law exempt from its responsible charge. The prevalence of certain classes of preventable disease in particular localities, as shown by these bulletins, has enabled the Board to call attention of the local authorities to the special dangers existing within their jurisdiction, and to advise them as to the general character of the remedies to be applied. It will appear by a study of the bulletins which will be found accompanying this report, and from the comments upon it of the committee on vital statistics, that a record is made of a little more than 80,000 deaths in the State, and that there are, besides these, some 7,000 or 8,000 more which are accounted for on the recording registers, but not printed in this monthly issue. Assuming the probable mortality of the State to be 100,000, it appears that registry has been secured of about nine-tenths of all that occur. By stimulating the organized boards to more perfect work and securing the organization of a considerable number of boards, not yet effected in the more retired parts of the State, further completeness will be secured. The routine of registration is found of secondary importance in keeping up the activity and vitality of local health organizations.

The character of the prevailing diseases in the State during the past year is fully set forth in the report of the Secretary, in the appendix, and a description is given of the measures taken by the State Board, regarding small-pox and other epidemics threatening the State. The power of vaccination in preventing the spread of small-pox has been thoroughly demonstrated during the past year. Although at different intervals since March, twelve cases of small-pox have been reported to the State Board of Health, from localities where, under ordinary circumstances, the contagion would have been

almost certain to spread widely, in only two instances outside of the cities excepted from the operations of the general act, has there been any extension beyond the initial focus. One of these was a nurse who supposed herself protected by a long passed attack of variola and who was not re-vaccinated.

In marked contrast to such fortunate results was the epidemic raging in Montreal among the un-vaccinated. There can be little doubt that the State was saved from a severe epidemic by the great activity of the local and State sanitary authorities. The thorough vaccination practiced will have an important effect in protecting from small-pox for a number of years, and the successful resistance of the invasion of the Montreal epidemic adds greatly to the confidence in the security which may be obtained by thorough sanitary work. The fear of approaching cholera has awakened renewed interest in questions connected with public sanitation. In many places this agitation will not, however, be allayed, until important sanitary reforms have been executed.

SEWERAGE.

Works of sewerage and drainage are greatly needed in many localities. The execution of such works has been retarded by the great cost of many sewerage plans and by the scepticism which still exists among many people, as to the importance and value of removing all sewage and foul wastes from the neighborhood of human habitation.

Another hindrance to the progress of sewerage in this State is the difficulty of disposing of sewage without creating a nuisance. The so-called separate system of small-pipe sewers, carrying sewage only with automatic flushing tanks, recommended itself to the Board at an early day on account of its small cost and superior cleanliness. The experience of the Board during the past year has accorded with that of previous years in respect to the adaptability of the separate system to the greater part of the small villages and cities of the State.

The working of this system in places where it has been tried for a number of years has been re-examined by direction of this Board during the past year, and the results are given in the report of the committee on drainage, sewerage and topography. We commend this report to the consideration of local authorities in this State who are considering the question of sewerage and drainage. The Board has constantly been called upon for expert advice and assistance from

localities requiring aid, that they could not otherwise secure, in investigating the prevalence of disease. While the want of public sewerage has proved one of the most important factors in the development of disease, the want of properly devised house drainage in sewered towns is often a potent cause of illness. The importance of having municipal plumbing regulations and a thorough inspection by skilled and responsible officials becomes yearly more apparent. It is to be hoped that this system of municipal regulations for plumbing which has proved so successful in New York and Brooklyn will be widely extended over the State.

DRAINAGE.

In many large districts the health of thousands of people is seriously impaired by the saturation of the soil. Not only does this refer to the marshes from which miasms arise and are borne over the surrounding tracts, but to regions where the ground-water is so high as to produce damp cellars and damp soil around the dwellings.

The diseases fostered by these conditions,— malaria, rheumatism, consumption, cerebro-spinal meningitis,— and indirectly others, are rife in many populous localities.

In a number of places where abandoned canals belonging to the State were the cause of complaint, drainage works have been executed with the result of producing marked improvement in the health of the localities The plans made by the Board during the past year have not been fully carried out, but will doubtless be completed during the next season.

There are various great swamps varying from one to several thousand acres in extent, and situated in many counties both in the southern, central, western and northern parts of the State, which are exerting a most harmful influence over the people who live about them. They contain in the aggregate a goodly number of acres, which, if reclaimed, would be among the richest and most fertile lands of the State. Under the present general Drainage Act it has proved impossible to secure the drainage of these tracts. After careful investigation of the causes of the failure of most efforts which have been made for extensive drainage in the State of New York, the Board recommended to the last Legislature the passage of an act, a copy of which is printed in the fifth annual report. It involved the principle of loaning State aid in the construction of the large outfall channels which are the essential basis of any system of

extensive drainage. The aid loaned by the State was to be repaid with interest by the localities, during a term of years sufficient to enable the land to become reclaimed and productive. The act recommended did not become a law, but the Board is confident that little or nothing can be done to reclaim the great swamps of the State until such an act is passed.

WATER SUPPLY.

The experience of the past year has added new proof that one of the gravest causes of preventable disease in this State is the drinking of impure water. The protection of private sources of water supply can only be accomplished by educating the owners of wells, springs and their surroundings in a knowledge of the watchfulness required to prevent the contamination of the house supply. To this end by investigations, by letters and by reports to local health authorities the State Board is endeavoring to awaken the people and instruct them as to the means necessary to prevent the pollution of potable waters.

The experience of the Board having shown that existing laws were not adequate to secure the thorough sanitary protection of public water supplies, an act was recommended to the last Legislature, which became a law, authorizing the State Board to make rules and regulations for the protection of any public water supply, which rules should have the force of law when approved by the judge of the county in which the water supply was located. Under this law rules were made for the sanitary protection of the water supply of the city of Rochester and the village of Fredonia. The report of the executive board of Rochester shows that the result has been a most effective protection from sources of contamination that seriously menaced the purity of their supply. It does not appear that the maintenance of these regulations has caused any hardship to property-holders upon the water-shed, but on the contrary, has resulted in a positive sanitary benefit to them.

In investigating the occurrence of preventable sickness in localities especially afflicted, in determining the causes operating, and in devising proper remedies for the insanitary conditions discovered, the Board requires the aid of expert skill of the highest order and the widest experience. Combined sanitary and engineering perception and knowledge is needed to detect the various dangers which threaten the public health and to give wise and efficient advice to suffering localities.

The experience required can only be obtained through years of actual investigation of a great variety of cases, such as come before a central board. It is, therefore, of the greatest importance, for reasons of public health and general economy, that the State Board of Health should be able to retain in its employment men of scientific attainments, whose accumulated experience in the solution of difficult sanitary questions becomes of inestimable value to localities needing sanitary advice.

The Board has thus far fortunately been able to command the services of such men to the extent of its limited means of remuneration; and so far as its funds have gone, expert advice and assistance have been gladly given to all localities needing help. The pressure upon the Board, however, for expert service in investigating the occurrence of disease and devising remedies for prevention has been much greater than its ability to respond. It is the duty of the Board to state that during the year many localities have needed expert help which they were not themselves able to secure, and which the Board for want of means could not supply. We feel sure that larger means at the disposal of the Board would result in an improvement in the public health of many localities that the Board is not now able to help except in words of general advice.

EDWARD M. MOORE, M. D.,
President.
ERASTUS BROOKS.
WOOLSEY JOHNSON, M. D.
ALFRED MERCER, M. D.
GEORGE W. COOKE, M. D.
DENIS O'BRIEN,
Attorney-General.
WILLIAM M. SMITH, M. D.,
Health Officer of the Port.
ALFRED L. CARROLL, M. D.,
Secretary.

REPORT

OF

EXECUTIVE AND FINANCE COMMITTEE.

REPORT

Of the Exeutive Committee on the Work and Expenditures of the Board from its Organization to the Close of its last Fiscal Year, September 30, 1885.

Organization and Duties.

On the 29th of May, 1880, the State Board of Health was organized and at once set about the discharge of the extensive range of duties specified in its organic law, chapter 322 of 1880. These duties are thus stated:

To take cognizance of the interests of life and health among the people of the State.

To make inquiries in respect to the causes of disease, especially epidemics.

To investigate the effects of localities, employments and other conditions upon the public health.

To supervise the State system of registration of births, marriages and deaths, and the registration of prevalent diseases.

To prepare forms for obtaining and preserving such records.

To insure the faithful registration of the same in the several counties and in the central bureau of vital statistics at the capital of the State.

To prepare forms with proper coupons attached for, and prescribe rules regarding, the issue and use of transfer permits to be issued by local boards of health for the transportation of dead bodies for burial beyond the limits of the county where the death occurs.

To secure compliance with these rules on the part of every common carrier or person in charge of vessels, railroad trains or vehicles, and

To examine and report upon nuisances affecting the security of life and health in any locality where the people, unable to gain redress from their local officials, seek the aid of the State Board of Health by petition to the governor.

Emphasis was given to these duties by chapter 431 of 1881, chapter 351 of 1882, and chapter 270 of 1885.

APPROPRIATIONS AND EXPENDITURES.

To commence this important sanitary undertaking the Legislature voted	$15,000 00
Additional appropriations have been made as follows:	
For year from October 1, 1881, to September 30, 1882.	20,000 00
For year from October 1, 1882, to September 30, 1883.	15,000 00
For year from October 1, 1883, to September 30, 1884.	20,000 00
For year from October 1, 1884, to September 30, 1885.	20,000 00
Total	$90,000 00

The expenditures of the board for the above five years and four months of its existence, as shown in detail in its six reports, aggregate	$89,123 98
Or an average annual expenditure of	$16,710 72

Subtracting the expenditures from the appropriations, there is found to be an unexpended balance to the credit of the Board on October 1, 1885, of $876.02. The Legislature appropriated for the fiscal year ending September 30, 1886, the sum of $20,000, so that for the current year to sustain its work the Board has this legislative appropriation of $20,000 plus $876.02 of unexpended balance at the end of the last fiscal year, or $20,876.02.

PUBLIC SERVICE RENDERED.

The first three reports of the Board give in concise form the results of its effort to call into existence, hampered as it was with imperfect and ambiguous laws, local boards of health in all the towns, villages and cities of the State, numbering over 1,300, and to put them in communication with the central office. The service being new, it was difficult to induce hearty compliance with the law and co-operation in a work essentially in the interests of the people.

The law imposed a two-fold duty on these boards (and upon the State Board the duty of enforcing it) first concerning the registration of vital statistics, and secondly in reference to the sanitary security of the community. The efforts of the State Board of Health were accordingly put forth in both of these directions. Forms for certificates of births, deaths and marriages, for burial and transmit permits, as well as for registers in which to record vital statistics, had to be prepared and sent as models to every local board

of health. Information how to record these vital records and how and when to forward the original certificates to the State bureau had also to be given and arrangements made with a printer to furnish these registry equipments at the lowest possible rate. Models for sanitary rules and regulations for local boards of health had also to be prepared, involving the consideration of the wants of these local boards as well as their legal powers. As each local board organized, estimates of the registry supplies needed, based upon population, had to be prepared and sent, so that some correct idea might be formed of the expense to each town, village or city. It is needless to say that this preliminary work entailed a vast correspondence as well as the issuance of over fifty different printed circulars of information. In addition to this numerous sanitary investigations were undertaken, epidemics grappled with and stamped out, and the people instructed as to the connection between insanitary conditions and disease, suffering and financial loss.

The position the Board attained at the end of its third year of public service was well summed up in the words of the late secretary, Dr. Elisha Harris.

"Called into existence by the Legislature of 1880, after twenty or more of the States had founded some form of central sanitary service, and after the Nation had gratefully witnessed upon a vast scale the proof that sanitary protection and vigorous health in time of war are equivalent to the strength of armies, the State Board of Health of New York organized its methods of public service on the basis of a broad reliance upon the share and enlightened concern which the people would have in this work and the objects of health laws. The expectations of the Board in this particular are being abundantly realized, for the people are concerned, and in their primary civil divisions of townships, cities, villages and school districts, are giving practical effect to whatever this Board has undertaken to do in compliance with the purposes and powers defined in the statutes relating to health.

"Though not wanting in certain kinds of authority, the policy of this department has mostly been directly the converse of centralization or dictation. From first to last the service has been chiefly one of studious instruction and guidance, the co-ordination of means to practical ends, bringing results of investigation of subjects of general importance to the public health to bear upon the sanitary welfare of the particular communities which seek the aid of the Board."

A review of the work of the last two years, when the results of earlier efforts began to manifest themselves and registration had commenced in the Central Bureau, will afford some idea of the extent of the Board's public service to the State.

The work of the year ending September 30, 1884, may be briefly summarized:

IN THE DEPARTMENT OF VITAL STATISTICS.

1. During this year for the first time registration in its three branches, births, marriages and deaths was steadily maintained, and special clerks assigned for each branch.

2. On the death of Dr. Harris, it was found, that the registration in all its branches was nearly two years behind, owing to the fact that the main efforts of the secretary had been directed toward the then more important work of explaining the law, enlightening the people and inducing organization of local boards. How to write up these accumulated arrearages without enlarging the office staff till such enlargement became imperative was then a serious question. It was finally decided to transfer the regular clerks to current work, and to employ a number of temporary assistants to bring up the arrearages, paying them by the piece. This was done, and a beginning made in March, 1884.

3. A monthly bulletin of mortality was also issued, the first number appearing in April, so that while arrearages were being recorded for the legal value they might have in the settlements of estates, the current mortality of places was set before the people as the best argument of the need and value of sanitary work.

4. Coincident with the issuance of the monthly bulletin became the need of an office mailing list, prepared in such manner as on the one hand to embrace all parties who ought to receive the Board's publications regularly, and on the other to obviate the long and tedious process of pressing into service all the clerks in the office for the purpose of doing this work by the pen. The addresses were prepared in sheets printed, perforated and mucillaged like postage stamps, so that nothing further is needed in despatching any publication than to give the office boy the regular number of sheets to paste addresses on as he would postage stamps.

5. The preparation of a tabulated nomenclature of causes of death, including names of 500 diseases, in English, French, German and Latin. This is designed for use of health officers, registry clerks and physicians, to secure uniformity in registration.

IN THE DEPARTMENT OF SANITARY WORK.

During the year there was a large demand upon the Board for sanitary service requiring the employment of expert aid; and the report shows the following record:

1. Investigation of pleuro-pneumonia in Flatbush where it was alleged cows suffering from this disease were kept for their milk supply and their flesh sold for food after death.

2. Investigation of the epidemic of diphtheria at Lansingburgh.

3. Issuance and widespread distribution of a sanitary memorandum of duties in the presence of a threatened epidemic of cholera.

4. Examination of the suitability of using an abandoned burial-ground for the erection of a school-house at Port Jervis.

5. The preparation of a law to protect the purity of potable water supplies, framed in response to constant appeals for aid which could not be responded to without additional legislation.

6. The maintenance of an inspection of offensive businesses in Kings and Queens counties, the dissemination of information concerning them, and the public accusation of such as were found to be violating the governor's orders.

7. The investigation of alleged cholera at Hoosick Falls.

8. The investigation of trichinosis at Arietta.

9. The preparation of plans for the drainage of the Chemung canal prism at Horseheads and supervision of work.

10. Investigation of insanitary conditions at Yorktown.

11. Investigation of insanitary conditions at Castleton.

12. Investigation of insanitary conditions at Oneonta.

13. Investigation of insanitary conditions at Valatie.

14. Investigation of insanitary conditions at Port Byron.

15. Investigation of insanitary conditions at Clifton Springs.

16. Investigation of insanitary conditions at Rochester, Ulster county.

17. Investigation of condition of the abandoned Chemung canal north of Elmira city line. Plan prepared for its drainage.

18. Investigation of the insanitary condition of Havana, and preparation of plan for its improvement, including drainage of canal prism.

19. Investigation of large swamp areas, and suggested plan for their sanitary drainage.

20. Investigation of insanitary condition of Saratoga Springs, and suggested plan for its improvement.

21. Investigation of the insanitary condition of Martinville and Beaver creek district, Albany, and plan for remedy.

22. Investigation and report upon insanitary condition of Port Richmond, and suggested remedies.

23. Investigation of epidemic of typhoid fever at Bath, Steuben county.

24. Investigation of village of Malone with reference to its need for sanitary drainage, and report thereon.

25. Investigation of the sewerage of the city of Kingston, and report thereon.

26. Investigation of nuisance at Sucker brook, Canandaigua, and remedies therefor.

27. Investigation of the summit level of the Chemung canal, and plan for its drainage.

28. Investigation of Hoosick Falls, and plan proposed for its drainage.

29. Investigation of Ogdensburg, and its need of sewerage, with report thereon.

30. Investigation of sanitary condition of Syracuse, with report thereon.

31. Further investigation and conclusion of the examination of the alleged nuisances at Glen Cove, and report thereon.

For year ending September 30, 1885, the following is a summary of the work accomplished:

I. VITAL STATISTICS.

(1.) The work of bringing up arrearages by means of temporary assistants, which was begun in March of the previous year, has been continued, and 51,800 certificates of births, deaths and marriages recorded in this way, besides the preparation, with dictionary, alphabetical precision, of four indexes, each index containing 21,000 names, with reference to volume and page of register in which particulars regarding every name may be found.

(2.) A clerk has also been kept busy on the current Death Register, another on the Birth Register, and a third on the Marriage Register, so that no further arrearages have been allowed to accumulate.

(3.) The Bulletin of Mortality has been issued monthly, and has been growing in fulness and accuracy. Several places, notably Troy and Cohoes, where suspicion as to the completeness of their mortality returns had been entertained, were visited by the Assistant Secretary, the records of cemeteries as to interments taken and compared with the actual return of deaths. The discrepancies thus ascertained formed the basis of correspondence with local boards health that has resulted in reforms beneficial to sanitary service.

(4.) The weakness of the law providing for registration having frequently been demonstrated in the efforts of the Board to induce local registration, an effort was made during the past year to remedy existing defects. It was found necessary to frame an entirely new law, preserving all the salient features of the old, and introducing such new provisions as the experience of the Board seemed to warrant. This resulted in the passage of chapter 270 of the laws of 1885, by which local boards have since worked and are now satisfactorily working. The main features of the new law are:

1st. The placing of the obligation to return to the local registrar certificates for registration

(a) In the case of births, on the parent or guardian,

(b) In the case of marriages, on the groom,

(c) In the case of deaths, upon the undertaker, or person having charge of the body.

2d. The making more definite the powers of local boards of health, and giving to the State Board authority to call upon them to convene whenever it is considered necessary in the interests of the public health.

(5.) A form for the recording of still births has been prepared and sent to every local board of health, so that the number of such occurring in any locality will be preserved for the sanitary information conveyed.

(6.) Two new record books have been devised and put in operation; (a) one containing, alphabetically arranged, an account with every local board of health in the State, showing the monthly receipts of certificates of births, deaths and marriages and still births; (b) The other containing the personnel of every local board of health, and the post-office address of the different members.

These form the two working factors in the bureau; the one shows the boards that are delinquent, and the other their post-office addresses, so that an active correspondence may be maintained to bring them up to the proper standard.

2. SANITARY WORK.

During the year there has been a considerable tax on the engineering and sanitary resources of the board. The following are among the chief works undertaken:

1. Investigation of the insanitary condition of the Albany basin, and plan for its improvement.

2. Preparation of rules and regulations for the protection of the purity of the water supply of the city of Rochester.

3. Investigation of and report upon epidemic of diphtheria at Sandy Hill, involving an engineering examination of the locality and chemical and biological examination of the water supply.

4. Preparation and approval of further plan for the drainage of the Chemung canal prism in the village of Havana.

5. Investigation of the defilement of the potable water supply of the village of Fredonia, and the preparation of rules for the preservation of its purity.

6. Investigation of and report upon the drainage of a swamp in the town of Westchester, near Clason's Point.

7. Preparation of a further plan for the drainage of the prism of the abandoned canal, between the villages of North Elmira and Pine Valley.

8. Investigation of the drainage of the new court-house in the city of Lockport, and report thereon.

9. Investigation of and report upon Elmira Reformatory sewer, and plan for its construction.

10. Report upon the sewerage of the village of Warsaw, and plan for the disposal of its sewage.

11. Investigation of and report upon a malarial nuisance in the town of Florida, Montgomery county.

12. Investigation of and report upon a malarial nuisance at Fairport.

13. Investigation of and report upon the sewerage of Middletown, Orange county.

14. Investigation of and report upon the insanitary condition of Canajoharie.

15. Investigation of and report upon the insanitary condition of Johnstown.

16. Investigation of and report upon malarial conditions at Harrison, Westchester county.

17. Investigation of and report upon a slaughter-house nuisance at Havana.

18. Investigation of and report upon an open sewer nuisance at Cohoes.

19. Investigation of and report upon the insanitary conditions at Rhinebeck.

20. Preparation of plan for the drainage of the abandoned canal at Rome.

21. Preparation of plan for the drainage of the Binghamton Insane Asylum.

22. Investigation, by order of the governor, of a drainage nuisance at Mt. Vernon and preparation of plans for its abatement.

23. Examination of sources of pollution of the water supply of the city of Cortland, and suggested remedies.

24. Various inspections of the condition of factories on Newtown creek and vicinity.

A large correspondence with local boards to induce local action in the removal of nuisances which they were entirely able to deal with unassisted, and various warnings to local boards to institute general vaccination and revaccination in their respective localities to protect the State from the small-pox epidemic then raging in Canada, which has been productive of such good results that the State has been saved from its ravages.

Not over two-thirds of the local boards of the State required by law are making complete returns of their vital statistics to the central bureau. When complete returns are received from all parts of the State, at least three additional recording clerks will be needed for the mere clerical work of registering the records.

SPECIAL WORK INTRUSTED TO THE STATE BOARD OF HEALTH.

Administration of the Law to Prevent the Adulteration of Food and Drugs.

On May 28, 1881, the Legislature passed the law known as chapter 407 of 1881, entitled "An act to prevent the adulteration of food and drugs," which required the State Board of Health within thirty days thereafter to meet and adopt measures for its enforcement and prepare rules and regulations for collecting and examining articles of food or drugs, and for the appointment of necessary inspectors and analysts.

To enter upon this new field of duty, the Legislature voted the inadequate sum of $10,000 and failed to make any further appropriation for the three subsequent years. This disproportion of means to the ends sought will be the more apparent when it is considered that but for *one* branch of this work, that relating to dairy products which the Legislature of 1884 placed under a separate commission, the sum of $30,000 was voted and $50,000 the following year, while for the entire field, during a period of four years from May 28, 1881 to June 13, 1885, but $10,000 was appropriated.

The Board met within the time prescribed by law and decided, as a first step in carrying out the provisions of the act, to make a careful examination of the food and drugs sold in different parts of the State in order to ascertain the nature and extent of the adulteration practiced; also to examine the methods of analysis in use for the detection of such adulterations, and to have presented for the use of those on whom the enforcement of the act would finally devolve the best literature on the subject. The administration of the law was referred to the sanitary committee and the following analysts elected:

Prof. G. C. Caldwell, Ph. D., Cornell University.
Prof. A. H. Chester, Ph. D., Hamilton College.
Prof. E. G. Love, Ph. D., New York.
Prof. S. A. Lattimore, Ph. D., Rochester University.
Prof. Wm. H. Pitt, M. D., Buffalo.
Prof. F. E. Englehardt, Ph. D., Syracuse.
Also two inspectors to collect samples.

The work was divided up among the chemists as follows:

Animal food.

I. Milk fresh and condensed. Undertaken by C. F. Chandler, Ph. D., chairman of the committee.

II. Butter, dairy and artificial, cheese, lard, olive oil and fruit essences. Assigned to G. C. Caldwell, Ph. D., Cornell University, Ithaca, N. Y.

III. Canned meats and animal foods, fresh, smoked, salted, canned, extracts and essences of meat and fish, gelatine and isinglass. Assigned to A. H. Chester, Ph. D., Hamilton College, Clinton, N. Y.

Vegetable food.

IV. Cereals and the products and accessories of flour and bread foods, wheat, rye, barley and rice, oatmeal, cornmeal, sago, tapioca

and leguminous preparations, special artificial foods for infants and invalids, baking powders, cream tartars, bicarbonate of soda, bicarbonate of ammonia, alum powders and the "alum question." Assigned to E. G. Love, Ph. D., New York.

V. Canned fruits and vegetables, preserves, vinegar, pickles, mustard, ginger, spices, antiseptics employed in preserving, glazing and enamel as affecting food articles. Assigned to S. A. Lattimore, Ph. D., University of Rochester, Rochester, N. Y.

VI. Sugars, syrups, molasses, glucose, confectionery, honey and soda-water syrups. Assigned to W. H. Pitt, M. D., Buffalo, N. Y.

VII. Tea, coffee, cocoa Assigned to S. A. Lattimore, Ph. D., University of Rochester, Rochester, N. Y.

VIII. Wines, beers, spirits and cordials. Assigned to F. E. Englehardt, Ph. D., Syracuse, N. Y.

Drugs.

IX. Crude vegetable and animal drugs. Assigned to F. Hoffman, Ph. D., New York.

X. Pharmaceutical chemicals and their preparations. Assigned to F. Hoffman, Ph. D., New York.

XI. Gelatine and sugar-coated and compressed pills of quinine. Assigned to G. C. Caldwell, Ph. D., Cornell University, Ithaca, N.Y.

XII. Granular effervescent salts, fluid citrate of magnesia, seidlitz powders. Assigned to W. G. Tucker, M. D., College of Pharmacy, Albany, N. Y.

The inspectors traveled over the State collecting samples, which were carefully labeled, numbered, recorded and sent to the proper analyst, and in the Second, Third and Fourth Reports are given elaborate reports of the work done, including tables of the articles analyzed, and the results of the analyses, as well as detailed statements of expenditures.

Numerous cases were prepared for prosecution, complaints made, the sellers of adulterated articles arrested, indicted and held for trial.

In regard to milk, that sold by two hundred and fifty different parties was examined, and exhaustive reports written, on milk fresh and condensed; the effect of various kinds of feed upon milk, the brewer's grain question, with microscopic examination and illustrations of cream, pure milk, skimmed milk and unhealthy milk. Cheese and its adulterations were also examined.

Law to Regulate the Standard of Illuminating Oils and Fluids.

On the 6th of June, 1882, the above act was passed. Like the law to prevent the adulteration of food and drugs, its administration was placed upon the State Board of Health, and an appropriation of $5,000 made for its enforcement.

Its execution was also assigned to the Sanitary Committee of the Board, and the work and expenditures will be found set forth in great detail in the second, third and fourth reports of the Board.

The law having fixed the legal flash test for oil at 100 degrees. Fahrenheit, according to the instrument and methods approved by the State Board of Health, it was incumbent upon the Board to determine upon a proper tester and methods by which oils could be examined.

Accurate details of the examination of every tester in use, and of the steps which led to the adoption of the New York State tester, are fully set forth in the published reports.

The oils sold in the State were fully examined, and startling facts disclosed, shedding much light on the origin of kerosene horrors. An oil was found in the market that flashed at the ordinary summer temperature of the laboratory. Several cases were prepared for trial, and a notable conviction secured in Batavia of an agent who had been flooding western New York with a dangerous illuminating fluid. The reports give the details of the work done, the flashing point of the various oils examined, and the efforts, successful and unsuccessful, to secure the indictment and punishment of violators of the law. The result has been to rid the market of a large part of the dangerous illuminators with which it had been previously flooded.

Note.

The last Legislature appropriated $10,000 to administer both the food and drug and oil laws, and three chemists of the Board are actively engaged in this work.

Their reports will be ready for the present Legislature.

Beers and Malt Liquors.

The last Legislature also imposed upon the State Board another specific duty: to examine all the beers and malt liquors brewed or distilled in this State, appropriating $3,000 for the work. Samples representing the product of every brewer in the State have been

collected, to the number of 500 and analyzed. A report on the entire subject is being prepared and will be ready for the present Legislature.

The above summary of the Board's work is respectfully submitted, showing, with entire confidence, that upon close examination it will be found to compare favorably both as to efficiency and economy with any departments of the State's service.

ERASTUS BROOKS,
Chairman.

FINANCIAL EXHIBIT.

Financial exhibit for year, October 1, 1884, to September 30, 1885, total, $25,738.05. Made up as follows:

For members' traveling expenses	$1,113 37
For miscellaneous expenses	3,995 84
For expert services	3,910 96
For salaries and wages	13,056 25
For expressage and telegraphing	230 19
For printing and stationery	3,073 37
For library	103 96
For petty cash	99 11
For furniture	155 00
Total	$25,738 05
Balance unexpended October 1, 1884	$6,614 07
Special appropriation for year	20,000 00
	$26,614 07
Deduct above expenses	25,738 05
Leaving a balance October 1, 1885, of	$876 02

TRAVELING AND NECESSARY EXPENSES OF MEMBERS.

1884.			
Oct.	18.	Erastus Brooks, per itemized account	$96 43
Nov.	15.	James T. Gardiner, per itemized account	15 00
	20.	J. Savage Delavan, per itemized account	10 60
Dec.	9.	James T. Gardiner, per itemized account	24 55
	17.	Alfred Mercer, per itemized account	52 71
	17.	Alfred L. Carroll, Secretary, per itemized account	36 85
	25.	James T. Gardiner, per itemized account	43 57
	25.	Dr. Edward M. Moore, per itemized account	32 40
	29.	George W. Cooke, per itemized account	35 50
	30.	Erastus Brooks, per itemized account	50 95
1885.			
Jan.	29.	James T. Gardiner, per itemized account	13 92
Feb.	17.	Wm. M. Smith, per itemized account	25 90
	28.	Wm. M. Smith, per itemized account	11 50

1885.			
Apr.	7.	Erastus Brooks, per itemized account......	$35 55
	16.	James T. Gardiner, per itemized account..	16 60
	20.	E. M. Moore, per itemized account........	36 68
	28.	Woolsey Johnson, per itemized account...	31 70
May	11.	James T. Gardiner, per itemized account..	21 16
	23.	James T. Gardiner, per itemized account..	17 35
	23.	George W. Cooke, per itemized account...	30 49
	15.	Fred'k Carman, per itemized account... ..	9 40
	21.	James T. Gardiner, per itemized account..	23 00
June	4.	Alfred L. Carroll, per itemized account....	6 45
	29.	James T. Gardiner, per itemized account..	17 30
July	2.	Erastus Brooks, per itemized account......	59 38
	7.	George W. Cooke, per itemized account ...	41 92
	7.	J. Savage Delavan, per itemized account...	13 40
	11.	Alfred L. Carroll, per itemized account....	5 00
	17.	J. Savage Delavan, per itemized account...	24 01
	20.	Fred'k Carman, per itemized account	19 08
	27.	George W. Cooke, per itemized account...	29 80
	28.	Alfred L. Carroll, per itemized account....	19 26
Aug.	6.	Alfred L. Carroll, per itemized account....	19 16
	25.	Edward M. Moore, per itemized account...	35 95
	25.	Dr. Alfred Mercer, per itemized account...	39 58
Sept.	29.	George W. Cooke, per itemized account...	24 36
	29.	Erastus Brooks, per itemized account......	86 91
			$1, 113 37

EXPERT SERVICES.

1884.			
Oct.	14.	O. S. Wilson, services as engineer........	$170 00
	14.	Arthur Hollick, services as sanitary inspector...........................	10 00
	26.	Horace Andrews, services as sanitary engineer	180 00
Nov.	5.	Arthur Hollick, services as sanitary inspector	20 00
	30.	A. D. Lake, report on enteric fever....	10 00
Dec.	11.	Horace Andrews, services as sanitary engineer	200 00
	16.	O. S. Wilson, services as sanitary engineer.	270 00
	17.	O. S. Wilson, services as sanitary engineer.	180 00
	20.	L. McLean, services examining cow stables..	50 00
1885.			
Jan.	5.	Willis G. Tucker, analysis of cheese and water	97 20
	8.	Arthur Hollick, services as sanitary inspector	10 00

1884.			
Jan.	15.	Horace Andrews, services as sanitary engineer	$150 00
	15.	P. C. Curtis, M. D., medical inspection	5 00
	15.	O. S. Wilson, C. E., services as sanitary engineer	80 00
	29.	O. S. Wilson, C. E., services as sanitary engineer	140 00
Feb.	5.	Horace Andrews, services as sanitary engineer	150 00
Mar.	10.	O. S. Wilson, services as sanitary engineer.	200 00
	10.	Horace Andrews, services as sanitary engineer	150 00
April	2.	F. C. Curtis, medical inspection	5 00
	7.	O. S. Wilson, C. E., services as sanitary engineer	180 00
	7.	Horace Andrews, C. E., services as sanitary engineer	150 00
	28.	O. S. Wilson, C. E., services as sanitary engineer	130 00
May	5.	W. G. Tucker, water analyses	35 00
	5.	Horace Andrews, C. E., services as sanitary engineer	70 00
	25.	O. S. Wilson, C. E., services as sanitary engineer	153 00
	25.	Horace Andrews, services as sanitary engineer	150 00
June	4.	Richard Prescott, sanitary engineering	30 00
	19.	Horace Andrews, sanitary engineering	80 00
	7.	James T. Gardiner, sanitary engineering	127 50
	7.	Arthur Hollick, sanitary inspector	30 00
	20.	Wm. Hailes, M. D., biological examination of waters per list	313 26
	23.	F. C. Curtis, medical investigator	10 00
Aug.	3.	Horace Andrews, sanitary engineering	5 00
Aug.	17.	James T. Gardiner, consulting engineer	195 00
Sept.	11.	Horace Andrews, sanitary engineer	20 00
	25.	James T. Gardiner, consulting engineer	150 00
	25.	F. C. Curtis, M. D., medical inspector	5 00
			$3,910 96

MISCELLANEOUS EXPENSES.

1884.			
Oct.	14.	O. S. Wilson, expenses	$66 62
	14.	Arthur Hollick, expenses	5 60
	14.	I. L. Carman, engrossing 8 sheets of death certificates and 47 of births	55 00
	14.	Engrossing 21 certificates of births	21 00

1884.			
Oct.	16.	H. Batchelder, engrossing 88 sheets of death certificates	$88 00
	26.	Horace Andrews, expenses	17 53
	31.	Brace M. Gallien, 125 sheets births	125 00
Nov.	1.	Anna L. Mattimore, 96 sheets deaths	96 00
	5.	Arthur Hollick, expenses	12 30
	15.	I. L. Carman, 30 sheets births	30 00
Dec.	1.	Howard Batchelder, 96 sheets deaths	96 00
	1.	Brace M. Gallien, 110 sheets death	110 00
	1.	Anna L. Mattimore, 75 sheets deaths	75 00
	1.	Anna L. Mattimore, typewriting	22 20
	1.	I. L. Carman, 20 sheets births	20 00
	11.	Horace Andrews, expenses	24 86
	15.	I. L. Carman, 30 sheets births	30 00
	16.	Frederick Carman, expenses	6 05
	17.	O. S. Wilson, expenses	49 36
	17.	O. S. Wilson, expenses	30 56
	17.	Howard Batchelder, 16 sheets deaths	16 00
	29.	J. N. McCormack, subscription to conference of State Board of Health, Washington,	10 00
	29.	George H. Robie, assessments to investigate disinfectants	50 00
1885.			
Jan.	2.	Brace M. Gallien, engrossing 125 sheets births	125 00
	5.	Anna L. Mattimore, engrossing 67 sheets certificates	67 00
	5.	Anna L. Mattimore, typewriting	26 20
	5.	Arthur Hollick, expenses	1 30
	15.	Isabel L. Carman, engrossing 10 sheets births	10 00
	15.	Horace Andrews, expenses	19 74
	15.	F. C. Curtis, M. D., expenses	3 85
	15.	O. S. Wilson, expenses	26 96
	15.	O. S. Wilson, expenses	73 48
	30.	Anna L. Mattimore, engrossing 83 sheets births	83 00
	30.	George H. Allen copying records of interments in Cohoes cemeteries	6 00
Feb.	3.	Brace M. Gallien, engrossing 125 sheets births	125 00
	3.	Horace Andrews, expenses	8 80
	6.	Isabel L. Carman, engrossing 34 sheets births	34 00
Mar.	2.	Anna L. Mattimore, engrossing 55 sheets births	55 00
	2.	Anna L. Mattimore, typewriting	25 46
	3.	Brace M. Gallien, engrossing 100 sheets births	100 00

1885.			
Mar.	10	I. L. Carman, engrossing 7 sheets births....	$7 00
	10.	O. S. Wilson, expenses..................	22 08
	10.	Horace Andrews, expenses.........	12 85
	10.	Anna L. Mattimore, engrossing twenty-nine sheets births.....................	29 00
	10.	Anna L. Mattimore, typewriting.........	14 00
	10.	Anna L. Mattimore, indexing....	59 04
Apr.	2.	I. L. Carman, indexing..................	24 00
	2.	F. C. Curtis, expenses..................	2 91
	3.	B. M. Gallien, engrossing thirteen and three-fifths sheets births...............	13 60
	3.	Brace M. Gallien, indexing...............	72 00
	7.	O. S. Wilson, expenses..................	31 57
	10.	Horace Andrews, C. E., expenses.........	30
	10.	Isabel L. Carman, indexing..............	24 00
	10.	B. M. Gallien, indexing, etc.	84 00
	22.	I. L. Carman, indexing, etc..............	24 00
	28.	O. S. Wilson, expenses..................	32 70
May	1.	Anna L. Mattimore, indexing, etc..	75 60
	1.	Anna L. Mattimore, typewriting..........	20 00
	10.	I. L. Carman, indexing..................	9 60
	10.	O. S. Wilson, expenses..................	32 20
	25.	Horace Andrews, expenses...............	18 11
	25.	B. M. Gallien, indexing.....	84 00
June	4.	Richard Prescott, expenses..............	6 40
	4.	Anna L. Mattimore, indexing............	113 52
	19.	B. M. Gallien, indexing.................	72 00
	19.	Horace Andrews, expenses...............	51 02
July	6.	B. M. Gallien, indexing.................	112 00
	6.	Anna L. Mattimore, indexing, etc	84 92
	7.	James T. Gardiner, expenses.............	21 08
	7.	Arthur Hollick, expenses................	3 65
	10.	Maria Pratt, indexing...................	48 00
	10.	I. L. Carman, indexing..................	76 00
	20.	B. M. Gallien, indexing.................	56 00
	23.	F. C. Curtis, expenses..................	4 17
Aug.	3.	Horace Andrews, expenses...............	5 15
	6.	Anna L. Mattimore, indexing, etc.........	81 52
	13.	I. L. Carman, indexing..................	36 40
	17.	James T. Gardiner, expenses.............	70 00
	17.	Maria Pratt, indexing...................	96 00
	17.	I. L. Carman, indexing..................	56 00
Sept.	11.	Horace Andrews, expenses...............	2 32
	11.	Anna L. Mattimore, indexing, etc.........	58 02
	25.	I. L. Carman, indexing..................	30 00
	25.	James T. Gardiner, expenses.............	33 55
	25.	F. C. Curtis, M. D., expenses............	3 85
	25.	Maria Pratt, indexing...................	168 00

1885.			
Sept. 25.	L. W. Pratt, engrossing 100 pages of marriages	$125 00	
25.	Anna L. Mattimore, indexing	40 84	
			$3,995 84

SALARIES AND WAGES.

1884.		
Oct. 31.	For amount of pay-roll, October	$1,066 65
Nov. 30.	For amount of pay-roll, November	1,066 65
Dec. 31.	For amount of pay-roll, December	1,085 45
1885.		
Jan. 31.	For amount of pay-roll, January	1,124 99
Feb. 28.	For amount of pay-roll, February	1,124 99
Mar. 31.	For amount of pay-roll, March	1,125 02
April 30.	For amount of pay-roll, April	1,124 99
May 31.	For amount of pay-roll, May	1,124 99
June 30.	For amount of pay-roll, June	1,125 02
July 31.	For amount of pay-roll, July	1,029 15
Aug. 31.	For amount of pay-roll, August	1,029 15
Sept. 30.	For amount of pay-roll, September	1,029 20
		$13,056 25

EXPRESSAGE AND TELEGRAPHING.

1884.		
Nov. 5.	Commercial Telephone Co., October	$5 00
5.	Western Union Telegraph Co., October	1 36
5.	American Express Co., October	6 05
5.	National Express Co., October	6 00
Dec. 1.	Commercial Telephone Co., November	5 00
1.	National Express Co., November	4 45
1.	American Express Co., November	7 20
1.	Baltimore and Ohio Telegraph Co., November	1 03
1885.		
Jan. 5.	Western Union Telegraph Co., December	1 42
5.	Five Cent Express Co., November	2 00
5.	National Express Co., December	9 40
5.	American Express Co., December	5 95
5.	Hudson River Telephone Co., December	5 00
Feb. 3.	Hudson River Telephone Co., January	5 20
3.	Western Union Telegraph Co., January	1 90
3.	American Express Co., January	5 35
3.	National Express Co., January	3 70

1885.		
Feb. 5.	Bankers and Merchants' Telegraph Co., December	$0 33
Mar. '5.	Hudson River Telephone Co., December	5 20
5.	Bankers and Merchants' Telegraph Co., February	25
5.	Western Union Telegraph Co., February	2 38
5.	American Express Co., February	2 50
5.	National Express Co., February	4 35
5.	Baltimore and Ohio Telegraph Co., February	78
April 2.	Hudson River Telephone Co., March	5 00
2.	National Express Co., March	3 00
2.	Western Union Telegraph Co., March	3 78
2.	American Express Co., March	3 35
May 5.	American Express Co., April	2 45
5.	National Express Co., April	3 15
5.	Hudson River Telephone Co., April	5 10
5.	Western Union Telegraph Co., April	6 19
June 4.	Western Union Telegraph Co., May	3 37
4.	Hudson River Telephone Co., May	5 00
4.	National Express Co., May	6 60
4.	American Express Co., May	5 90
19.	Baltimore & Ohio Telegraph Co., May	26
July 1.	American Express Co., June	2 10
1.	Western Union Telegraph Co., June	10 36
1.	Hudson River Telephone Co., June	5 25
7.	National Express Co., June	3 55
Aug. 3.	Baltimore & Ohio Telegraph Co., June	37
6.	Hudson River Telephone Co., July	5 00
13.	Western Union Telegraph Co., July	8 55
13.	American Express Co., July	4 35
Sept. 11.	Hudson River Telephone Co., August	5 00
11.	Western Union Telegraph Co., August	10 06
11.	National Express Co., August	9 20
17.	American Express Co., August	6 15
30.	Western Union Telegraph Co., September	5 20
30.	Hudson River Telephone Co., September	5 25
30.	American Express Co., September	1 50
30.	National Express Co., September	3 55
		$220 19

PRINTING AND STATIONERY.

1884.		
Nov. 22.	Weed, Parsons & Co., printing	$250 05
22.	Edwin Ellis & Co., stationery	5 65
26.	Fergus Halpen, printing	4 75
Dec. 3.	Van Benthuysen & Co., printing	125 00
10.	Fergus Halpen, printing	10 00

1885.		
Jan. 29.	Julius Bien & Co., lithography...........	$150 00
Feb. 18.	Julius Bien & Co., lithography...........	85 50
27.	R. K. Quayle, engraving.................	8 00
Apr. 30.	R. K. Quayle, engraving.................	40 00
May 10.	Fergus Halpen, printing.................	2 50
26.	Fergus Halpen, printing.................	10 00
June 7.	Van Benthuysen & Sons, printing........	399 00
7.	Van Benthuysen & Sons, printing........	70 35
12.	Weed, Parsons & Co., printing...........	654 11
12.	Van Benthuysen & Sons, printing........	554 50
30.	Fergus Halpen, printing.................	3 75
July 3.	Fergus Halpen, printing.................	5 00
21.	R. K. Quayle, printing..................	4 17
23.	Van Benthuysen & Sons, printing........	257 30
Sept. 25.	Weed, Parsons & Co., printing...........	289 24
29.	Van Benthuysen & Sons, printing........	144 50
		$3,073 37

LIBRARY.

1884.		
Nov. 3.	D. Appleton & Co........................	$4 00
15.	Wm. Gould...............................	19 50
Dec. 1.	Colton & Co.............................	10 00
5.	Putnam & Co.............................	2 50
1885.		
Jan. 15.	Wm. Wood & Co...........................	5 00
15.	*The Sanitarian*, subscription to..........	4 00
Feb. 18.	J. Vail & Co............................	12 00
18.	J. B. Beers.............................	10 00
Mar. 10.	Wm. Gould...............................	2 50
14.	*Sanitary Engineer*, subscription to.......	4 00
Apr. 4.	Journal of Compr. Science...............	2 00
June 4.	A. S. Barnes............................	9 00
19.	Sampson, Davenport & Co.................	3 00
July 11.	J. H. Vail..............................	4 88
Aug. 21.	W. Eskermann............................	2 58
21.	Ex. F. N. Spoon.........................	1 00
		$95 96
	Geo. McDonald...........................	8 00
		$103 96

PETTY CASH.

1884.		
Nov. 15.	Draper & Brown..........................	$6 00
22.	R. K. Quayle............................	5 00

1884.		
Dec. 19.	Rent of P. O. box	$3 00
22.	James Groesbeck	16 80
22.	Eimer & Amend	45 76
1885.		
Jan. 29.	M. L. O'Brien	4 00
Mar. 10.	S. G. Spier	1 00
19.	Rent of P. O. box	3 00
Apr. 10.	Albany News Co	30
15.	James Groesbeck	3 50
17.	T. H. McAllister	2 75
June 14.	Edwin Ellis	75
July 11.	Frederick Carman	4 25
Sept. 25.	Rent of P. O. box	3 00
		$99 11

FURNITURE.

1884.		
Dec. 1.	Fairbanks	$6 00
1885.		
Jan. 22.	S. & P. Templeton, dusters	3 85
30.	Draper & Brown	9 00
Mar. 14.	W. B. Moore	12 00
16.	W. B. Moore	1 00
June 19.	D. Boughton	5 00
Aug. 13.	Van Heusen & Charles	4 00
Sept. 25.	Eimer & Amend	9 83
29.	Hammond, typewriter	100 00
29.	Michael & Co	4 32
		$155 00

REPORT OF THE SECRETARY.

REPORT OF THE SECRETARY.

Although the registration of Vital Statistics is yet far from complete, a gratifying increase in the number and character of the returns forwarded by local registrars is noticeable. Under the amended public health act of 1885, which became a law in June last, the duty of reporting births devolved upon the parents or custodians of the children born; that of securing the record of a marriage upon the groom; while the responsibility for obtaining and presenting certificates of death was placed, where it properly belongs, upon the undertaker or person having charge of the burial. The former acts failed to specify upon whom these duties should fall, and nearly all the local boards of health, in their discretionary power to supervise and regulate the registration within their respective jurisdiction, had relied on physicians exclusively for returns of nativity and mortality. But apart from the doubtful legality of compelling medical practitioners to report family details for forensic purposes, it was evident, as was pointed out in the introduction to the fifth annual report of the Board, that "complete" records could not be obtained by this method. Among the poorer classes, a very large percentage of the births occurs without the attendance of a physician, perhaps under the ministration of some irresponsible and ignorant midwife, often without extrinsic aid of any sort; and even where physicians have fully complied with the requirements of the local sanitary authorities, it is probable that at least forty per centum of the births have escaped registration. Despite the thorough organization and comprehensive powers of the New York City Health Department, the recorded birth rate in the metropolis for many years has fallen far short of the death roll, demonstrating the insufficiency of the existing system of obtaining returns, and in scattered rural populations the difficulty in this respect is greater. Some time must, of course, elapse before the public will have become familiar

with the provisions of the new law, but although scarcely more than six months have passed since its enactment, already the proportionate number of birth certificates transmitted to the central bureau has much increased and is monthly increasing.

The alteration in the provisions for recording marriages was based partly upon the almost insuperable neglect or reluctance of many clergymen and magistrates to send formal certificates to the local registrars, and partly upon the fact that in this State neither a religious nor a civil ceremony is required to constitute lawful wedlock. In view of this anomalous condition of affairs, it is certain that some more or less transient alliances which would possibly be declared valid by the courts, but which in reality are merely cloaks for concubinage, will never be recorded; but when the purport of the law shall be generally understood, it is probable that all who honestly contemplate an enduring partnership will avail themselves of a system which places the legitimacy of their offspring beyond dispute.

In addition to the increased efficiency of previously existing registration, by dint of unremitting effort the number of local boards called into active operation has been much enlarged. But to maintain this machinery in motion, constant supervision is needed, for the reason that, except in our cities, the local boards are subject to frequent changes of their entire personnel. In villages the tenure of office is only one year; in townships the town clerk is usually the registrar, being a member of the board, ex-officio; and since, unfortunately, in many places political considerations prevent the reappointment or re-election of the person who has become familiar with his duties, we have each year a succession of new and inexperienced incumbents, to be indoctrinated in the technical details of their position. Save as regards this element of instability, the present act leaves little to be desired for the protection of public health, and for the perfection of our registration, if its provisions were intelligently and energetically carried into effect. To obviate to some extent the difficulties of local administration arising from such transitions, and to render unnecessary frequent special meetings of health boards in sparsely settled districts, a code of regulations was framed, with the approval of the Attorney-General, in conformity with the new law, and covering the general principles of sanitation, and suggested to the various local organizations as a model in lieu of the "Model Code" formerly issued by the State Board, but rendered inoperative through the repeal of the laws on which it was founded.

The courts having decided that members of local boards of health are State officers to whom under a general statute are delegated certain "police powers" of the Legislature, it was determined by the Civil Service Commission that the various local health officers were subject to the civil service rules, under the schedule which provides for either competitive or non-competitive examination, at the option of the appointing body, and as a result of this system it is hoped that greater efficiency and longer retention in office will be obtained.

In cities, the mayor has the nomination of the members of the board of health, who are confirmed by the common council; two for a term of one year; two for two years, and two for three years. In this way, the board becomes a continuous body, two new members being appointed each year; but after the first year each appointment is for a term of three years. No term, however, is specified for the health officer, who is appointed at the first organization of the board to be "health officer for such city," he therefore holds office during the pleasure of the board, or until his successor is appointed; *i. e.*, indefinitely.

In villages, the trustees are directed to appoint a board of health each year, although in case of their failure so to do, the existing board continues in valid operation. As in cities, the health officer is not appointed for any specified term, but is "health officer for such village." It is not therefore necessary for each annually chosen board to make a fresh appointment of a health officer, or even formally to renew the tenure of the existing incumbent.

In towns, the boards of health are composed of ex-officio members, with the exception of the citizen member; but although the term named is only one year, the varying tenures of the justices of the peace gives an element of continuity to the organization. Here again the health officer is appointed without limit of time, and holds his position until he is superseded.

It is thus evident that the law contemplates permanency in the position of the medical officer whose duties require special training, and whose efficiency will be increased by practical experience in sanitary administration. Indeed, it is obvious that the health officer must be the skilled adviser as well as the executive officer of his board, and that each new board must largely depend on him to guide it in its action, and to maintain the necessary continuity of operation.

Beyond the bare records of deaths from different diseases, it has

been impossible to tabulate data of real statistical value. To reach conclusions of sanitary importance it is necessary to compare the mortality at different ages with the number of persons living at such ages; to balance the deaths under one year of age by the number of births during the year; to separate sexes, occupations, races, social conditions, density of population, and sundry other factors which have an essential bearing on the lessons to be drawn from the death roll. But to sift out even a few of these requirements of tabulation from the multitude of death certificates monthly received at the central bureau would occupy a much larger clerical force than that at present employed, which is not adequate to the actual needs of mere registration of current events; and to fulfill all the conditions would demand a more complete system of returning births than is likely to be achieved for some time to come, and an accurate and elaborate census enumeration. It has, therefore, been impracticable to do more than to show the percentage of deaths from the various zymotic diseases, and the ratio of deaths under five years to the total mortality. In connection with this latter computation it should be remembered that although, other things being equal, the mortality of childhood is to a certain extent a criterion of the sanitary condition of a locality, yet there are several possible sources of fallacy in basing an opinion thereon, unless we know the relative proportion of children and adults in any given community. Among the more luxurious classes, where many domestics are employed in each household, the relative death rate of childhood will be less than in a perhaps more healthful district where prolific couples of smaller means do their own household work. Again, in some places, hospitals or asylums for persons in advanced life may introduce a confusing element by apparently showing an excessive mortality from particular diseases, or, on the other hand, by counterbalancing the infantile death rate with a misleading preponderance of survivals to old age. Examples of such disturbing factors exist in the Soldiers' Home at Bath, Steuben county, which unduly increases the necrology of that township, and in the Sailors' Snug Harbor at New Brighton, Richmond county, of which the 800 inmates yield a large but extremely ripe harvest to the Grim Reaper. When, as in both these instances, the inmates become permanent residents, and even voters of the district, and are counted in the census as an integral part of its population, it is difficult to devise any practicable method by which the seeming unfairness to the locality can be rectified in statistical tables, since the

only basis for calculating the death ratio is, of course, the total number of inhabitants.

In many parts of the State one of the principal difficulties to be overcome in the interest of public health is the high level of the ground water, even apart from the wide regions of actual marsh land. It is needless to reiterate the lesson taught in this respect by the too great prevalence of malarial fevers which often assume an almost malignant type, or to repeat the teachings of universal experience in relation to the efficiency of sanitary engineering in diminishing and ultimately abolishing such fevers. Even where drainage has been undertaken solely for agricultural advantages, as in most parts of Great Britain, the incidental benefit to human health has become the most prominent result of the operation, and in regions formerly almost uninhabitable miasmatic ailments are now unknown. But these are not the only disorders attributable in part, at all events, to the same cause. The investigations of Bowditch and Buchanan long ago showed the close association of soil-saturation with pulmonary consumption, not, perhaps, as an immediate cause, but as unmistakably favoring the development and hastening the course of the disease;* and when we see that from this one malady nearly a thousand deaths per month occur, or about fourteen per centum of the total mortality of the State, it may well be asked if legislative action be not justified and demanded. In but few instances can private enterprise suffice; conjoined action is needed to carry a drainage system to a proper outfall in the majority of cases, and one ignorant or unaccommodating landholder may thwart the desires and imperil the health of a community by refusing to co-operate or even to permit an outlet through his property. Sometimes a miasmatic region can only be relieved by obtaining an outlet through an adjoining township, or into another county; oftentimes the land is of too small value by reason of its very saturation, to bear the cost of

* Bowditch's conclusions were that: 1st. A residence in or near a damp soil, whether that dampness be inherent in the soil itself, or caused by percolation from adjacent ponds, rivers, meadows, marshes, or springy soils, is one of the principal causes of consumption in Massachusetts, probably in New England, and possibly in other portions of the globe. 2d. Consumption can be checked in its career and possibly, nay probably, prevented in some instances by attention to this law.

Buchanan's observations, from a different point of view, showed that the rate of diminution of phthisis corresponded with the depth of drainage, amounting to fifty per cent in the best drained districts.

Simon, commenting on these facts, declares that an undrained or damp state of soil answers the legal definition of a nuisance, and that sanitary authorities ought to be "bound to provide that such a state shall not continue through want of proper constructions for the drainage."

the remedy which, if applied, would enhance its worth four-fold by increasing its fertility. Indeed, this purely financial aspect of the question has caused the Act under which the English government has advanced funds for drainage, to be entitled one for the Improvement of Land; the rapid appreciation of the taxable value enabling both interest and principal to be repaid without hardship.

In still another class of examples soil-saturation is induced by artificial obstacles to natural drainage; either by miscalled municipal "improvements," obstructing water-courses or valleys worn by the water itself through centuries, and turning the yield of a wide shed into an insufficient channel; or by the triumphs of insanitary engineering which carry railways across land and water, bisecting hills and filling vales, regardless of creating swamps with their embankments, or of aught save making a level pathway for the iron steed.

The apparent influence of soil-saturation as one, at least, of the factors in the causation of Cerebro-spinal fever is shown in an interesting monograph by Dr. Meredith Clymer, published in 1872, when the disease first made its appearance as an epidemic in the city of New York, and illustrated by a map indicating the localities of the reported cases in relation to the topography of the city. This map demonstrates, as the author remarks, that "the chief nests of the epidemic were in those districts in which the original water-courses had been dammed by the filling up of streets and avenues, and over the adjoining water-saturated land. Most of the cases of the disease were grouped on and about the made land, originally marshes. One of the most striking examples is in Collect place, a swampy spot in the fourth ward. Basements over these marshy places are never dry, and the walls are often covered with cryptogams."

The association of this, as of several other zymoses, with dampness of soil had been noted by previous observers in this country and abroad; but it has never been so clearly pointed out as in the above-mentioned map, the original of which was prepared by Dr. Moreau Morris from the records of the New York Health Department. Soil moisture alone, however, is to be regarded only as affording favorable conditions for the development of other as yet unknown morbific agents, of which some of the products of decomposing organic matter are undoubtedly the most potent, and filth-contamination of the soil and ground water seems to be an essential element in the problem. As might have been expected, overcrowd-

ing and want of ventilation have frequently been associated with outbreaks of the malady, but these are rather to be viewed as intensifying the poison and lessening individual power of resistance, for, as Simon remarks, "In some cases, according to local reports, the distribution of an epidemic has very decidedly not been governed by conditions of overcrowding and ill-ventilation."* In the New York epidemic of 1872, Clymer observes that where the disorder occurred away from the marshy districts, "the elected haunts were densely populated tenement dwellings, in which the house drainage was invariably found in bad condition. The part played by the diffusion of foul sewer gases in favoring the development of the disease would seem, by the collected evidence, to be unquestionable," and he quotes from Dr. Morris's report that, "Wherever we have carefully examined the local conditions, it has been found that the drainage of the premises has been faulty, or that the immediate surroundings have presented such conditions as must necessarily give rise to some form of disease, — cellars containing decomposed or decomposing vegetables, garbage, or other filth, in a putrefactive condition, and privy vaults located beneath sleeping-rooms, windows in cul-de-sacs, where there were no free currents of air. The most usual defects discovered were connected with house drainage. These cases are not confined to the abodes of the dirty, squalid and poor, but houses of a better class, with brown stone fronts, have furnished their victims." In one of these latter, of which a description is given, the main waste pipe in its course through the cellar "had openings at the section joints and at the connections of the smaller waste-pipes from above; these fissures and openings had been hid and covered with a sort of soft cement, quite permeable and useless for its purpose. Underneath the kitchen-sink there had been such a leakage that the beams, together with the flooring over them, had rotted away, and emitted an odor like that from an old ice-box. This leakage had only been very recently repaired before the disease appeared in the house."

In the rural districts, when Cerebro-spinal fever occurs, it will usually be found that these two factors of filth-pollution and water-saturation of the soil coexist where the disease obtains an endemic foothold. There may be apparent exceptions to this rule, as where the malady has shown itself in elevated sandy situations. But in these domiciliary conditions of a similar character may commonly be discovered. Ziemssen [Cycl., vol. II, p. 695], says: "Poverty,

* Eighth Report of the Med. Officer of the Privy Council.

insufficient nourishment, and damp, overcrowded, badly ventilated, unclean ground floors * * * the overcrowding of dwelling and sleeping rooms, and the consequent loading of the air with animal emanations, perhaps also the saturation of the soil with garbage and the products of its decomposition, appear to be as powerful agents in the germination of the contagium as they are in that of cholera."

Despite the voluminous bibliography of the subject, we know very little of the ætiology or intimate pathology of this fatal disorder, which seems not to have been recognized before the present century, and of which the symptomatology is so capricious that, even in comparatively recent literature, according to Dr. N. S. Davis [Trans. Am. Med. Ass'n., 1866], "no less than three or four diseases have been confounded together." Farthermore, the difficulty of its study is increased by the circumstance that, unlike most of the specific zymoses, it affords no evidence of communicability or portability, but arises apparently spontaneously in the most isolated districts, often confining itself to single tenements or groups of houses, with no tendency to spread beyond them. Enough is known, however, to justify its classification among "filth diseases," and its greater prevalence during the colder months, when house warmth makes an indraught of the ground-air, strengthens the belief that its prevention is to be sought in proper drainage and purification of the soil, including, of course, the removal of all existing sources of pollution.

The deaths reported from this disease have ranged from twenty-five to fifty-three per month, distributed over the various districts of the State, and when it is considered that these deaths represent probably thrice as many cases, their significance becomes more ominous.

The prevalence of "filth diseases" as population becomes more dense emphasizes the need of adopting safer methods of refuse disposal than are now in use in the majority of our cities and villages. As far as sewage proper is concerned, where the topography of the locality permits and a fitting outfall can be obtained, the "separate system" of small pipe sewers with an adequate flushing supply affords an economical relief, although commonly with the drawback of contaminating streams into which the crude sewage is discharged, to the detriment of riparian communities below; and the cost of purification by irrigation or "downward intermittent filtration" is too great for its general introduction. But wherever water-carriage is employed, it is practicable to precipitate the suspended solids and

to render the effluent less noxious, at all events, if not quite harmless. In many places the method of "dry removal" might be advantageously and at small expense substituted for the present vile practice of polluting soil, water, and air by storing putrescent excrement in porous privy pits in close proximity to habitations and sources of water supply.

The beneficial effects of local sanitary organization in even partially awakening public attention to dangers of this kind are already manifesting themselves in a gradual reduction in the mortality from the diseases which bear the closest relation to contamination of drinking water, namely, typhoid fever and diarrhœal disorders. The following table, comparing the ratio of deaths from the principal zymotic maladies to the total deaths from all causes in 1884 and 1885, as far as shown by the returns to the Bureau of Vital Statistics, affords some suggestive evidence in this respect:

RATE PER 1,000 DEATHS FROM ALL CAUSES.

	1884.	1885.
Typhoid fever	15.33	13.27
Diarrhœa	131.07	90.80
Conjoined rate of Typhoid and Diarrhœa	146.40	104.07
Measles	14.02	14.55
Scarlatina	13.02	14.72
Whooping Cough	14.14	10.37
Diphtheria and Croup	47.65	56.06
Small Pox	——	0.41

It is noticeable that while there has been a decrease in the Typhoid and Diarrhœa rate, the relative morality from Diphtheria has shown an increase, its greatest fatality occurring in the colder months. Apart from any question of contagion, the propagation, if not the origin of this disease, is probably in the majority of cases largely dependent upon filth-factors of an intra-domiciliary character — faults of construction, house drainage, plumbing, etc.— which are in but small degree affected by public sanitary improvements or amenable to the efforts of local boards of health. Something may be done by compelling the removal of gross accumulations of putrescent refuse from premises, but until each individual householder is taught to care for the sanitary condition of his home in every respect, and to appreciate the truth of the homely adage, "an ounce of prevention is worth a pound of cure," we cannot hope for the extinction of a pestilence which is destroying nearly four thousand young lives per

annum. With strange inconsistency, a single death from that rarest of all diseases, Hydrophobia, will set a whole community agog, and arouse an insensate crusade of extermination against healthy dogs at any cost, while the very people who are foremost in such prophylactic panic apathetically close their eyes to the many thousands of deaths occurring annually from easily preventable maladies, and grudge the smallest outlay to avert losses far greater than the most disastrous war would inflict. At the lowest estimate of the pecuniary value to the community of a human life, Billings calculated from the census returns of 1870, "that the direct pecuniary loss to this country on account of preventable sickness and mortality is certainly over $100,000,000 annually, and this, without taking into account expenditures incurred on account of sickness,* etc., or the unusual losses due to great epidemics, both from waste of life and injury to commerce." (Introduction to Buck's Hygiene.) In this State alone, a similar computation will show that a saving of at least $10,000,000 annually might reasonably be hoped for from sanitary improvements; a gain which, at six per cent, would compensate for a capital investment of over $165,000,000. But to realize this gain, the probable causes of disease must be dealt with before the effects are manifested; to quote Billings again, "Sanitary measures, to be effective, should be carried out at those times when most people see no special cause for anxiety, and often, therefore, appear to involve unnecessary worry and expense." It is this unsentimental and purely monetary aspect of the question which must be impressed upon legislators and the public at large before preventive medicine can obtain the recognized place which it deserves as one of the most important objects of government; it must be generally learned that human health and productive industry bear a direct relation to the public treasury; that, as Farr has said, "Like capital invested in the soil, in the vintage, or in a commercial adventure, the capital invested in the life of man returns, in happy natures, profit of a hundred fold; in other cases, fifty, twenty, ten fold; in others it is barely returned; in some it is entirely lost, either by death, sickness, vice, idleness or misfortune."

Beside excremental and liquid wastes, a question of moment arises in all populous settlements in relation to the disposition to be made of garbage and other solid matters which cannot be admitted to sewers. In too many instances this problem is allowed to solve

* It is computed that each death in a community represents two years of illness in the aggregate; or, to state it differently, for each person who dies two are constantly ill.

itself by simply letting such substances accumulate in situ on the premises in which they originate, or in the streets and alleys adjacent, until complete decomposition carries off the effluvia, and a few of the inhabitants with them. In somewhat more civilized corporations it is customary to make a contract for the collection by carts of these residua, which are deported to a dumping ground on the outskirts of the municipality, where they create a concentrated nuisance. Fortunate are the localities where a large proportion of the filling in of sunken land for prospective speculative building sites is not composed of material of this sort. It is neither difficult nor expensive to get rid of all this organic refuse by burning it, and in many places abroad furnaces for this purpose, of different capacities, are used, which will consume house garbage, slaughter-house offal, street sweepings, and rubbish of every kind, with an inconsiderable outlay for construction and management. The adoption of this plan in our larger cities might perhaps deprive some of the malodorous industries in the bone-boiling and fertiliser line of a portion of their raw material; but it would undoubtedly mitigate the complaints of the dwellers within olfactory distance of Newtown creek and Barren Island.

Early in June, small-pox threatened to assume epidemic proportions in Montreal, where, owing to the opposition of the French Canadian population to vaccination, an immense unprotected field was open to its ravages. The danger from this source, in view of the constant intercommunication at many points along our extended border, was fully realized; but the State Board was without means to put skilled inspectors on guard to exclude infection by all the various channels of importation. Fortunately, the new Public Health Act, passed last winter, makes definite provision for the exercise by the local boards of health of "proper and vigilant medical inspection and control of all persons and things arriving from infected places, or which, for any cause, are liable to communicate contagion," and farther ordains that every such board shall "at all times provide thorough and safe vaccination for all persons within its jurisdiction who may need the same." Moreover, the local sanitary authorities are required to take "definite proceedings upon matters concerning which the State Board of Health, or its President and Secretary, shall be satisfied that the action recommended by them is necessary for the public good, and is within the jurisdiction of such board of health." Advantage was taken of these provisions to call into active operation, as far as possible, all the city, vil-

lage, and town boards upon the frontier and the main routes of travel, and an official circular was immediately sent to them, announcing the impending danger and urging prompt measures to secure efficient vaccination, especially of children in the public schools and persons employed about railway stations, boat-landings, and other places of passenger or freight traffic. This was followed by other circulars of instruction and advice as the varying exigencies of the case required, and, in addition, throughout the summer and autumn, continual private correspondence was maintained with numerous local boards and health officers in response to inquiries touching particular details of their duties and powers. A difficulty at once arose in obtaining vaccine virus in sufficient quantity to meet the emergency. Although the law prescribes that all expenses incurred by the several boards of health shall be a charge upon their respective cities, villages, and towns, in most of the villages and in all towns the boards are without funds for cash expenditures, and their payments must be deferred until the items are audited and included in a subsequent tax-levy. On the other hand, private dealers in vaccine are not willing to submit to the delay and uncertainty of this method of procedure, but usually demand immediate payment. This obstacle was surmounted through the aid of Dr. J. B. Taylor, in charge of the vaccine service of the New York City Health Department, who kindly made arrangements to supply all orders from local boards of health at the lowest possible cost and "on credit." In this way, and with the energetic co-operation of the boards of health in the most exposed positions, protection has been afforded to the people, not only of the localities chiefly concerned, but of the State at large, which, without this precaution, would in all human probability have suffered from an extensive diffusion of infection.

Happily, among our resident population there is seldom found any reluctance to accept the protection afforded by Jenner's great discovery, and if argument were needed at the present day to prove the efficacy of this protection, it could be forcibly drawn from the fact that, although at different intervals since March, twelve cases of small-pox have been reported to the State Board from localities where under ordinary circumstances, the contagion would have been almost certain to spread widely, in only two instances outside of the cities excepted from the operation of the general act, has there been any extension reported beyond the initial focus, one of these being in the person of a nurse, who, supposing herself immune

through a long past attack of variola, was not revaccinated, and contracted varioloid from the patient on whom she was attending.* In frightful contrast to such fortunate results, the epidemic was raging in Montreal and its environs among the unvaccinated, with alarming mortality, inflicting incalculable damage upon commerce and industry and leaving hundreds of hearth stones desolate. But even there it fell lightly on those who had been primarily vaccinated in infancy, and as far as is known spared altogether those who had been properly revaccinated. In face of facts like these and thousands of similar portent, which are familiar to all who have cared to learn, the fanatics who seek to excite ignorant animosity against the great-

* NOTE — On the 3d of March, it was reported that a railway flagman of the West Shore line was at a lodging-house at Coeymans Junction, with suspicious symptoms, and Dr. F. C. Curtis visited the place to take such action as might seem necessary. On his arrival, however, it was found that the patient, though feeling unwell, had gone on with his train to Syracuse. The account given of the case warranting a belief that he was suffering from the preliminary fever of variola, the persons who had been exposed to contact with him were vaccinated and kept under observation until the period of incubation was past. Notice of the probable danger was sent to Syracuse, where, on March 7th, the nature of the disease was declared. The city board of health promptly isolated the case, vaccinated the persons who had been in any way exposed to infection, and quarantined those who had actually held intercourse with the patient. Of these latter, two were subsequently attacked; one of them with a mild form of varioloid, thirteen days after successful vaccination, the other, who had probably contracted the malady at Coeymans Junction, but who had escaped vaccination, with unmodified variola which proved fatal. No extension from these foci occurred.

The supposed origin of this outbreak is traceable to a lady who had arrived from Germany in the steamship *India*, February 6, and soon afterward started for Chicago in a sleeping car on the West Shore road. She complained of feeling ill during the journey, and on reaching Chicago was found to be suffering with small-pox. The car was fumigated and the bedding in the section occupied by her was burned; but apparently the process was insufficient, for when the car was returned to the road, on the 19th, it was placed in charge of the flagman whose seizure on March 3, just twelve days afterward, points to it as the probable vehicle of infection.

It has been attempted to connect the beginning of the Montreal epidemic with this episode, on the ground that two conductors were transferred from the train at Chicago to a Canadian line, and it is asserted that the first case of small-pox was discovered in Montreal on the 28th of February. But while it is impossible to disprove the assertion, the fact, stated by Dr. Covernton at the conference of State Boards of Health, in December, 1884, that the disease was then prevailing in Ontario, renders it at all events possible that the importation may have had its origin from that Province, through fomites if not infected persons.

It is worthy of notice that although no disease was reported to have occurred on board the *India* during the voyage, with the exception of a fatal case of pneumonia, the captain shortly after her arrival in port was discovered to have an eruption which was diagnosed as "chicken-pox." As the vessel sailed from Hamburg, January 15, the duration of the voyage was too long to admit the supposition that the disorder had been contracted before departure, and it is likely that some infected luggage, opened about midway across the ocean, was the immediate source of contagion.

Another importation from abroad occurred in the person of a child in a Polish family which arrived in New York from Bremen on the 10th of May, and started at once for Buffalo, in which city the patient was dicovered on May 23, the disease being at about the

est boon ever conferred by science on humanity cease to hold a claim on our pity for their folly, and deserve to be regarded as public enemies.

Another lesson to be derived from our frontier experience relates to the futility of relying on quarantine alone to exclude contagious disease. In all the cases reported, the malady did not declare itself until several days after the arrival of the patients, who had crossed our boundary during the incubative stage of the infection, showing at the time no signs of illness, but having, perhaps, been unconsciously and casually exposed to the contagium during their journey in railway cars or other public vehicles. If altruistic sanitary

seventh day of its course. Here, again, the infection was evidently acquired during the passage, and not at the port of departure, and the patient landed unsuspected on our shores while the malady was incubating. This case gave rise to much apprehension in Buffalo, as the family had found quarters in a crowded district, inhabited principally by Poles of the lowest class. Immediate steps were taken, however, by Dr. Briggs, the health officer of the city, to secure isolation and disinfection, and all unprotected persons in the vicinity were promptly vaccinated. Thanks to these precautions, no spread of the contagion took place.

On June 16, one case of small-pox was reported at Plattsburgh, the first invasion from Canada.

Early in July the disease showed itself in Long Island City, but, owing to the chaotic condition of the local board of health, it was not reported to the State Board, and there are no means of knowing how many cases occurred. On the 9th of the same month, two cases were found at East New York, the origin of which it was impossible to trace, and on the 18th, another case occurred in the same family. No extension to adjoining households happened.

September 21. One case at Little Falls; no spread of the infection.

October 21. The captain of a canal boat arriving at Rouse's Point from Canada, was found to be suffering from small-pox. The boat was quarantined half a mile from shore, and no further cases were reported.

On the 10th of October, a lady with her two children came from Montreal to visit her father in the town of Mooers, Clinton county. By the order of the local board of health, she returned on the following Monday to Canada, but left the children with their grandfather. On the 22d, one of these children was found to have small-pox, and in about twelve days afterward the second one and also another member of the family sickened. The house was quarantined and placarded, and after the recovery of the patients disinfection was practiced by the health officer; but it is suspected that during the illness an eccentric neighbor, who dabbled in diagnosis on the strength of his maritime experience, entered the premises "to find out whether it was small-pox or not." At all events, on the 5th of November, this inquisitive neighbor's son was reported to the health officer as having variola, and the latter gentleman confirmed the diagnosis, despite the indignant dissent of the father. This case is not positively traced to infection from the first mentioned household, and may have had a different origin, as the locality is on a direct line of travel from Canada.

October 24. A new inmate of the Essex county poor-house displayed the eruption of variola. The patient was isolated, all persons who had been exposed were vaccinated, and a nurse who, having had the disease, was supposed to be protected, was engaged. On the 11th of November, this nurse sickened with varioloid.

December 4. A case reported from Quarryville, near the village of Saugerties, the eruption having declared itself five days previously The infection was probably contracted in Albany, as described in the following letter from Dr. Kemble, health officer of Saugerties:

efforts could everywhere be directed to isolating communicable disease at its place of origin and preventing its exportation, quarantine might merit the confidence reposed in it by some continental authorities; but it can never be completely efficacious to guard against importation, and the most important function of preventive medicine is to endeavor to diminish individual susceptibility to infection; to remove, as far as possible, all conditions which may favor the multiplication and dissemination of the poison.

When the Provincial Board of Health assumed control of traffic and travel from Montreal, under the capable superintendence of Dr. Covernton, every available step was taken to prevent the exit

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To the Secretary of the State Board of Health:

SIR — I have the honor to make the following report of case of varioloid in this town: *James Stone*, a resident of this town, while at work on capitol at Albany, was taken sick November 23, 1885 (Monday), and on Wednesday came home to spend Thanksgiving, when he took to his bed, and a physician was sent for. On Saturday the 28th, the doctor noticed an eruption, and told me his suspicions in the case, and said he would report at his next visit in the morning. Sunday 29, he pronounced it a case of varioloid. The man lived three and a-half miles from the village of Saugerties, in a one and a-half-story frame house, along a country road — a couple of hundred yards from other houses. I went at once and placed them in quarantine.

The family consisted of father, mother, and four children; the latter under ten years of age, two of which had never been vaccinated. The whole family were at once vaccinated. Quite a number of people had been in on Thursday and Friday, but no one after, to my knowledge. The man could give no clue to source of contagion; said he had been to the *theatre* and to *church* (he was a Catholic).

Everything was promptly removed from his bed-room, and the children directed to be kept up stairs, as much as possible; there was but one room besides his bed-room down stairs. A guard was placed outside to do errands, etc., and nothing permitted to pass out of the house, not even a postage stamp. On Thursday, the sixth day since the doctor noticed the eruption, he was flighty at night and also Friday. Saturday evening when I called at the door, his wife said he was better, he rested better that night, but toward morning had a chill and soon after died. That evening he was put into a coffin and box and his bedding was taken some distance from the house and with a favorable wind *burned*. His body was then brought to the Catholic cemetery in this village and buried in a deep grave at midnight. The widow and her four children were kept in quarantine until fourteen days had elapsed, after his first breaking out, then the living rooms were thoroughly disinfected (the bed-room having previously been), and the quarantine declared raised.

The vaccinations all took, and up to date, there has been no further development of disease. His disease was of confluent variety; very profuse over head and upon extremities. There has been a pretty thorough vaccination in the town, and the people may well be thankful, that owing to prompt action of board of health, there has been no further spread of the disease. I am very respectfully,

Your obedient servant,
WARREN KEMBLE,
Health Officer,
Saugerties, N. Y.

December 18, 1885.

A fatal case, which by an oversight was not reported to the State Board at the time of its occurrence, happened at Kinderhook. On the 24th of December, a lady residing in Albany went thither to visit her mother, whose family consisted of eight persons, including two unvaccinated children. On the 26th, she first complained of feeling ill, and on the 28th the eruption appeared, becoming confluent, and death ensued on the 31st. Dr. Pruyn, health officer of Kinderhook, secured prompt vaccination of all the inmates of the household, and proper isolation and disinfection, and it is hoped that no farther danger is to be apprehended.

[Since the above paragraph was written, Dr. Pruyn has reported, under date of January 10, that all vaccinations proved successful, and that no other cases haven arisen.]

The exposure in this instance is supposed to have occurred through intercourse with a teamster employed at the Albany alms-house, who is alleged to have been engaged in the pest-house belonging to that institution, and who, according to the patient's own statement, had visited her house.

of infected articles, or of persons who could not show evidence of protective vaccination; and the beneficial effect of such action has been demonstrated in the comparative exemption of Ontario from invasion and the ease with which the disease has been "stamped out" in the few places where it has occurred. But though the exodus by public means of conveyance was thus regulated, there still remained too many risks of private access to this State to permit any relaxation of vigilance on the part of the local boards of health. The shores of Lake Ontario and the St. Lawrence river offer innumerable landing places for small boats, while more than sixty miles of our boundary consist of an imaginary land line, crossed by roads and pathways open to the casual wayfarer. Even had it been possible for health boards in the border towns, with their limited resources, to watch every point of entry, their jurisdiction does not extend beyond their corporate bounds, and they could have no control over suspected persons or things until their territory had actually been invaded. Early in October the Governor of New York appealed to the United States Treasury Department for aid from the "epidemic fund" appropriated by Congress, and in compliance with his request the Marine Hospital Service organized a system of inspection under the supervision of Surgeon Austin, agents being stationed at the principal boat landings and at all the entries of railways, with instructions to examine approaching trains and prohibit the ingress of passengers and luggage without a satisfactory medical certificate of freedom from infection. This system, however, was designed only to protect the frontier line, and not in any wise to trench upon the jurisdiction of the local boards of health, or to relieve them from responsibility in respect of sanitary administration within their respective municipalities.

The cost of vaccine, even at the lowest rates, is a serious tax upon many of the smaller communities, and, since the whole State is concerned in having every locality rendered invulnerable to epidemic disease which may thence spread to adjoining populations, it appears only equitable that aid should be extended to the local boards in furnishing the virus which they are expected to apply gratuitously. At comparatively small expense, the State Board could make arrangements, either on its own account, or by contributing to enlarge the facilities of the New York City Vaccine Department, to provide reliable virus at all times in sufficient quantity for such gratuitous use.

The deaths from small-pox during the past year were: In April,

one in Syracuse; in June, three in the city of New York; in July, two in New York, one in Long Island City, one in East New York; in September, five in New York; in October, three in New York, one in Albany, one in Essex county poor-house; in November, eight in New York; in December, five in New York, one in Quarryville, one in Kinderhook.

Typhus fever, which had for some time held no place in our mortality records, showed itself early in the year in New York city and Brooklyn, and up to the end of November fourteen deaths had occurred from this disease in these two cities, twelve of them being in the former; no cases having been reported in any other locality in the State. In the latter part of November, however, an outbreak took place in the Albany penitentiary, which at one time threatened to assume dangerous proportions. The contagium was doubtless introduced by some recent convict, the sanitary condition of the prison being good, and the inmates who had been long confined having been previously free from disease; but as the nature of the malady was not recognized until many persons were affected, the origin of the first case could not be ascertained. As soon as the City Board of Health was informed of the existence of the disease, active measures were taken to prevent its spread, and it is now believed to be under control. The observations of the local board in the present epidemic have seemed to fix the maximum incubation period of the infection at two weeks from the known dates of exposure, and have, as might be expected, indicated that the malady manifests no great extent of contagiousness under favorable conditions of cubic space, ventilation, and cleanliness.

At the beginning of the year apprehension was entertained of the probable importation of Asiatic Cholera, which had committed disastrous ravages in the south of France during the preceding season. Happily, this country was spared a visitation of the pestilence, although, as was anticipated, it again spread in the Mediterranean districts, causing in Spain and Italy alone, up to the middle of October, over 100,000 deaths, and showing itself in less portentous proportions in France, China and Japan. Its continuance in scattered cases in the Mediterranean provinces during the past winter gives warning that the warmer weather may induce a renewed outbreak, and that our domestic precautions to abate all conditions which might afford it a lodgment should be energetically maintained.

POTABLE WATER.

The question presented to the sanitarian in connection with water pollution is not whether a given specimen of water is certain, or even likely, to cause immediate disease among its consumers; but whether it affords conditions which may, under possible future contingencies, originate or propagate zymotic disorders. And this is a question which, in the present state of our knowledge, neither chemical nor biological processes can satisfactorily determine. Nearly all modern chemists of any eminence are agreed as to the inadequacy of analytical methods to pronounce upon the wholesomeness of water, howsoever useful they may be in measuring its chemical purity. Nichols remarks that "it is not only difficult but impossible, either to determine the total amount of organic matter, or to decide upon its origin. As far as the total amount is concerned, the fact that it cannot be determined is a matter of no great consequence. Even if the chemist could say with certainty that a particular water contained exactly one or two or five parts organic matter in 100,000, we should be far from having the data necessary to form an opinion as to the wholesomeness of the water, for it is evident to any one that a pound of sugar or of glycerine would have a very different importance from that of a pound of (dry) fœces, yet either is a pound of organic matter." A cup of coffee or tea contains more organic matter than a dangerously polluted water, and a weak solution of quinine will yield enough organic carbon and nitrogen to condemn a water by Frankland's process if the source of the admixture were unknown. Mallet, after an elaborate comparison of the various methods in use, separately and collectively, while he attaches much importance to a determination of nitrates and nitrites, concludes that, "it is not possible to decide absolutely upon the wholesomeness or unwholesomeness of a drinking water by the mere use of any of the processes examined for the estimation of organic matter, or its constituents;" that such processes "should even be deemed of secondary importance in weighing the reasons for accepting or rejecting a water not manifestly unfit for drinking on other grounds;" and that "there are no sound grounds on which to establish such general 'standards of purity' as have been proposed, looking to exact amounts of organic carbon or nitrogen, 'albuminoid ammonia,' oxygen of permanganate consumed, etc., as permissible or not. Distinctions drawn by the application of such standards are arbitrary, and may be misleading." On the other hand, Wanklyn, who is the originator and enthusiastic upholder of the "albuminoid ammonia"

test, proclaims that "presence or abundance of nitrates does not show defilement by means of sewage, and deficiency of nitrates does not show absence of defilement, * * * and it cannot too strongly be insisted upon that the nitrates afford no data of any value in judging of the organic quality of a water." Indeed, anyone who is conversant with the numerous controversies between Tidy, Frankland, Wanklyn, and others will be inclined to agree with Folkard in his assertion that "eminent water analysts had brought forward apparently conclusive evidence of the worthlessness of all processes of water analysis except their own, and he was convinced that each one of these chemists was right." Such an assertion is, of course, not intended to cast discredit upon the skill of the chemist or the accuracy of his quantitative results; the essential point at issue from a sanitary outlook lies in the interpretation of these results. What may be "impurities" in the eye of the technical chemist (such as carbonate of lime or other mineral matters), may be of very trifling hygienic import, whilst a water that would be passed as reasonably pure by the most exacting analyst may convey disease. Thudichum has said that there may be waters "perfectly clear and palatable, in which the chemist would discover no appreciable amount of organic matter, and yet they would carry death wherever they were consumed." Ekin has stated that he had "over and over again, examined water that had undoubtedly given rise to typhoid fever, and found that it contained a very small amount of organic matter, and he had gone into districts where there could be no sort of contamination, and examined the springs, rivers and brooks, in which he had frequently found large amounts of organic matter that by no test could be distinguished from the organic matter in sewage." Huxley is reported as declaring that "water might be as pure as possible from a chemist's point of view, and yet be most deadly." Frankland says: "I have myself mixed one volume of the dejection of a patient dying of cholera with 1,000 volumes of good water, and have submitted it to analysis, and have been unable to detect any thing unusual in the water; chemical analysis is unable to detect these small quantities of morbific matter which are calculated to transmit disease to people drinking the water." De Chaumont gives, in his lectures on State Medicine, tables of analyzed waters, showing that "in several cases with a small amount of albuminoid ammonia specific disease was present, whilst in others with a much larger amount no disease was traced," and on another page he remarks that "an increase in such substances as nitric and nitrous acids and ammonia is only evi-

dence of previous contamination of a dangerous kind, but no proofs by themselves of existing danger." In fact, nitrogen as nitrates and nitrites is found in almost infinitesimal quantities in fresh sewage, these being the products of destructive oxidation, usually in the soil, and not necessarily derived from sewage, as nitrates may be furnished in large amounts by certain geological strata, notably in the case of chalk, or even by the air to falling rain. Farthermore, as was shown by the Report of the Rivers Pollution Commission, "nitrates and nitrites are also rapidly destroyed when the organic matter in the water containing them enters into putrefaction, a condition which often occurs in streams or reservoirs containing much polluting organic matter." It was Frankland who first dwelt upon the importance of this estimation of what he christened "previous sewage contamination;" but his indefatigable opponent, Wanklyn, retorts that "the only object worth keeping in view is the present or actual impurity, and that the search for past contamination is a confession of the untrustworthiness of the test for actual contamination." The latter chemist, as has already been noted, lays almost exclusive stress on the quantitative determination of albuminoid ammonia, so called because albumen is one of the principal substances which yield ammonia on distillation with an alkaline solution of permanganate of potash; on this process, however, Frankland has visited the severest retaliatory criticism, and Nichols, while admitting its value in certain respects, observes that, "because different amounts" (of albuminoid ammonia) "are obtained from the same weight of different nitrogenous substances, as well as on account of the fact already alluded to, that the oxidation of different substances by the permanganate of potash is more or less incomplete, the figures obtained have a relative rather than an absolute significance."

The now almost entirely abandoned estimation of "organic and volatile matter" by ignition, and the various processes for ascertaining the "total oxygen absorbed" by organic matter from a permanganate solution, have had their advocates and their opponents; chlorides, though always present in sewage, may come from many other sources and their amount is by all analysts considered only in connection with other data, many waters having induced disease where but a very small percentage of chlorides was present, and many innocuous waters containing quite large amounts. In fine, although nearly all the proposed tests may suffice to cast suspicion upon a water, yet, since they show products rather than processes of decomposition — indicating the presence of substances possibly adapted to

injurious fermentative action, but not the ferments themselves — all candid investigators concede their insufficiency to decide the question of safety or danger. To take a positive stand in this respect is to risk the ludicrous inconsistency quoted by Fox, where the water of the same well being analyzed by five chemists of repute, the first opines "that the water is of good quality;" the second, that "it is surface water, and is bad;" the third, that it contains "so much organic matter as to be unfit for drinking;" the fourth, that it is "a perfectly pure water, and quite fit for all domestic purposes;" the fifth, that "the water is unusually pure." It is but fair to add that some of these opinions were from gentlemen who classed harmless mineral substances as "impurities."

In the report of a committee, of which Prof. C. F. Chandler was chairman, to the State Board of Health in 1882, the status of chemistry in its relations to hygiene is admirably summarized by Waller, who frankly admits that, "In reviewing the methods of water analysis for sanitary purposes, and the conclusions to be drawn from the results, we cannot but conclude that our knowledge of the whole matter falls very far short of what is desirable. * * * At the present time, the utmost that we can do is to endeavor to discover whether a given water affords favorable conditions for the growth of dangerous germs, assuming that hypothesis to be correct. The processes of putrefaction, especially those of animal matters, are most likely to afford organisms dangerous to the human system, therefore, though some dangers are to be apprehended from decaying vegetable matter, the dangers from the presence of sewage in a water are much greater. If, then, we could detect even the minutest traces of sewage in a water, it would serve as a basis for pronouncing a decision upon it. But here again we are at fault, since, so far as known, there is no element or principle existing in sewage and characteristic of it, which would survive the percolation through a few feet of soil, that does not exist in waters of undoubted purity." And of the attempt to define fixed standards of purity, he adds that, "by this means we may condemn many good waters as bad, and what is worse, pass many bad waters as good."

The appended table will show some of the standards of purity adopted by different chemists, and indicate how far a few analyses of water compare therewith. It is, however, hardly necessary to adduce farther argument in support of the self-evident proposition that an undetectable admixture of the specific poison of cholera or typhoid fever is more to be feared than a vastly greater contami-

nation with the products of decomposition of non-specific matter. It is a thing of common experience that water highly contaminated with even excremental matter may be drunk for a long time with apparent impunity by many people; but that at some unexpected moment, either from an as yet unknown change in the fermentation-process, or as is oftener probable, from the introduction of an almost inappreciable quantity of specific infective excreta, an outbreak of typhoid fever may devastate the community thus supplied. The disastrous epidemic at Plymouth, in Pennslyvania, last year, affords, according to the recorded phenomena, an illustration of this difference between quantity and quality of pollution, the disease seeming to have selected the consumers of the water from a reservoir contaminated by the discharges from a single typhoid fever patient, and spared those who used that from wells containing much more organic matter as indicated by chemical tests. A still more striking example was that at Caterham, in England, where the evacuations from a temporarily employed laborer with "walking typhoid" found access to a large well sunk in the chalk for public supply, and sufficed to distribute the malady extensively along the water-mains. Scores of similar instances, as regards the dissemination of both typhoid and cholera by extremely minute volumes of infective material abound throughout sanitary literature. There appears to be increasing evidence in support of the belief, as old as the days of Hippocrates, that malaria may be conveyed by water. Within recent years, several observations, principally in India, have shown the association of malarial fevers in otherwise exempt localities with the use of water from streams flowing through marshes and jungles some distance away, and it is pointed out that the most dangerous streams are those which rise in the dense forest and are overhung in part of their course by thick foliage and underbrush, while those which are bordered by sand and boulders are generally innocuous. (British Medical Journal, No. 1245, p. 942.) It is, of course, obvious that in the existing state of chemical science no analytical process could detect this sort of morbific contamination, nor is such an achievement possible until, if ever, pathology shall have determined the precise nature of the various contagia. There is, perhaps, some reason to suspect that these may ultimately come to be classed among chemical products of fermentation in which the various micro-organisms now generally regarded as specific play the part of ferments, their reaction on their environment evolving, as a tertium quid, the real materies morbi; a something to be classed, perhaps,

among the as yet little studied group of the ptomaines. Pasteur's experiments in "attenuating" the virulence of certain "microbes" by successive cultures in comparatively simple media until ultimately they become quite innocuous, and, per contra, the apparent intensification of the "micrococcus septicus" by successive transmissions through animals, point to this essential influence of the environment, if not to the possibility that the medium may be more concerned in the character of the product than the particular kind of microzyme. The fact that different observers have insisted on their discovery of different micro-organisms as the specific causes of one and the same disease, as in the cases of typhoid fever and cholera, lends some weight to the arguments of the polymorphists who like Naegeli, believe that the pathogenous bacteria are "nutrimental" modifications of the non-pathogenous varieties, and that any of the schizomycetes may manifest itself "as the agent of acidification of milk, of putrefaction, and as the agent producing several maladies." Hueter, at the International Congress of 1881, announced his belief in the possibility, "that at any spot the putrefactive processes may take on such a course that micro-organisms arise from them which produce scarlatina." It is well known that various fungi may act like torula in producing alcoholic fermentation, and that the torula itself may, in alternate generations, give rise to alcoholic or acetous fermentation. Ziegler, in his Pathological Anatomy, remarks: "It does not, however, follow that each kind of decomposition is due to a single specific fungus, nor that one fungus may not give rise to more than one kind of decomposition." And further on he says: "It is possible that harmless colonies of bacteria may become dangerous if they are removed from their normal seat to other regions. Thus the saliva, when it contains bacteria, may excite violent inflammation if it reaches the bronchi or alveoli of the lungs;" and again, "though we may partake with impunity of many fermenting or decaying substances as food, we must not think that all the products generated by the non-pathogenous are equally harmless. Highly poisonous substances are formed in many of the bacterial decompositions. One of the most speedily fatal of diseases, septicaemia, is due to poisoning of the system with the products of bacterial putrefaction, or sepsis. Cadaveric poison, the poison of decaying fish, sausage, cheese, mussels, etc., are very probably the chemical products of special forms of putrefaction." On another page he reminds the reader that "it is bacteria which superinduce putrid decomposition in albuminoid

bodies. * * * When albuminoids undergo putrid decomposition, we have formed peptones and similar bodies; a certain putrid principle or poison (Panum), and bodies resembling ferments; sepsin (Bergmann and Schmiedeberg), nitrogenous bases, like leucin and tyrosin,'' etc., etc.; and in this connection it is to be borne in mind that the most potent agent of ordinary putrefaction is the non-pathogenic bacterium termo. Sir James Paget, in the Bradshawe lecture of 1882, after referring more particularly to individual susceptibility as affording the soil for the multiplication of disease-germs, remarks that, "even among those in whom they do germinate, the product varies according to the soil." In the preceding year Dr. Harley's experiments had led him to affirm that, "a fungus which may have no toxic properties when grown on one soil, may acquire toxic properties sufficient to be deleterious to animal life when grown in another." The idea thus shadowed forth, of modification by the environment, is ingeniously supported by Dr. Millican in his interesting work on "The Evolution of Morbid Germs" (London, 1883). Simon, in his article on Contagion in Quain's Dictionary, adverts to the "analogy in the facts which Professor Mosler has put together in explanation of the blue milk contagium of dairies; facts showing that the omnipresent penicillium glaucum, if its spores happen to light in particular (morbid) sorts of milk, will operate distinctively on their casein as an anilin-making ferment, rendering the milk blue and poisonous, and imparting to each drop of it the power to infect with a like zymosis any normal milk to which it may be added;" and he continues, "in our own more special field, pathologists have already learned that certain of the so-called "morbid poisons"— the contagia of erysipelas, pyæmia, and tuberculosis, are intimately related to the common ferment or ferments of *putrefaction;* and that the most vehement of these contagia can be developed by the artificial culture of successive transmissions in the living body from the comparatively mild contagium of any *common inflammatory* process." The most recent contribution to the chemical side of this vexed question is that of Professor Brieger, who, in a monograph (*Die Ptomaine*, Berlin, 1885) describes and formulates eight alkaloidal products of putrefaction, including a definite, extremely toxic, and apparently specific base, having the formula C5 H13 N O, resulting from the putrefaction of mammalian flesh. The author promises still further to investigate the products of the reactions of micro-organisms upon organic matters.

The evidence that microphytes (aside from any discussion as to

their specificity) act as ferments without whose presence putrefaction does not occur, has given lately considerable prominence to the method of biological examination of suspected water, and although this has not yet been sufficiently prosecuted to establish it on the basis of scientific accuracy, its indications encourage a hope of its increasing value in the near future. It is certain that the number of colonies of bacteria appearing in a solid nutritive-gelatin medium, inoculated with different specimens of water, and the rapidity of the liquefaction of the medium under their influence, are not proportioned to the amount of impurity predicated by chemical analysis, but do seem to bear a relation to the pathogenic properties of the water. The present state of our knowledge on this subject was summarized in a paper before the International Pharmaceutical Congress at Brussels in September last, by M. Van de Vyvere, whose conclusions are that a potable water should not contain either any of the so-called colorless algæ, many infusoria, or bacteridiæ; that the addition of sugar should not lead to the development of fungi; and that when cultivated in gelatine it should not produce numerous colonies of bacteria, nor should these cause liquefaction of the medium in less than eight days.

Both experience and experiment show that the alleged self-purification of running water occurs to but a limited extent, and in most instances the supposed phenomenon is explicable rather by dilution than by purification. In the case of the river Irwell, which after receiving pollution at Manchester, runs eleven miles and falls over six weirs in its course to the Mersey, chemical analysis could detect scarcely any appreciable purification at its mouth. Indeed, the conclusion of the Rivers Pollutions Commission, in the famous "Sixth Report" was that there was no river in the United Kingdom long enough to purify itself if contaminated by sewage near its source, and that, "in the case of river water, there is great probability that the morbific matter, sometimes present in animal excreta, will be carried rapidly down the stream, escape decomposition, and produce disease in those persons who drink the water; for the organic matter of sewage undergoes decomposition very slowly when it is present in running water."

Filtration, by any method practicable on a large scale, although it will arrest suspended particles and may thus greatly improve the condition of a water in some respects, is not to be depended on as regards matters in solution, nor, except in laboratory experiments

with porcelain, to remove bacterial organisms. Chemists filter the very reagents which they employ in their analyses, knowing well that no weakening of the solutions is thus caused, and physicians and pharmacists constantly use the same process in their practice.

In view of the uncertainty of both chemical and biological examinations in the present state of our knowledge, the greatest importance attaches to the purely physical inspection of the surroundings of a source of water-supply to ascertain if there be any possible danger of its contamination, and if this be discovered, and cannot be surely prevented, the water is to be shunned, irrespective of all analytical testimony in its favor. As Corfield observes, "the average quality of a drinking water supplied to a place is not the matter of most importance, and, indeed, is rather a fallacious guide. What we want to know is the quality of the worst sample that the public are likely to be supplied with at any time." Simon's statement, that "it ought to be an absolute condition for a public water supply that it should be uncontaminable by drainage," is indorsed by the opinion of Parkes (Quain's Dict.) that "the great point in choosing water is, in practice, its freedom from any change of contamination with excreta or with refuse matter from habitations;" and it would be easy to multiply quotations from the most eminent sanitarians to the same effect. It is this probability of contamination which renders rivers the least desirable sources of supply everywhere, and especially where riparian communities are allowed to discharge large volumes of sewage into them, or where their banks permit the inflow of surface washings from cultivated land.

When any suspicion attaches to a particular water, and it is impracticable to procure a pure supply without delay, recent experimental researches warrant the belief that it may be rendered innocuous for temporary use by boiling. Although the crucial test of actual experimentation with the various contagia has not been applied, there is sufficient evidence that the "pathogenic" bacteria associated with most of the infectious diseases are unable to withstand boiling for half an hour or even less. On the other hand, a temperature much below zero does not destroy the vitality of these micro-organisms, and freezing is ineffective, either from a chemical or biological point of view, in purifying water. For this reason as much care should be exercised with regard to the source of ice as of water for potable purposes. The greater part of the salts, even those which constitute the "hardness" of water are expelled in

congelation, but other and more deleterious matters in solution may remain almost undiminished, and organic substances in suspension, as well as different varieties of bacteria, may be retained unaltered.

ALFRED LUDLOW CARROLL, M. D.

SANITARY COMMITTEE.

REPORT OF THE SANITARY COMMITTEE.

The work of the sanitary committee has consisted in making a sanitary examination in localities where special disease or danger of disease was alleged to exist, and in giving such expert advice as seemed to be required in each case. The reports on these examinations are herewith given.

At Catskill, the complaint arose from alleged improper disposal of garbage, but Dr. Curtis, acting as inspector for the State Board, finding other insanitary conditions, went over the whole question of the sanitary improvement of the town with the local board of health, giving them the advantage of his advice and experience in village sanitation.

At Johnstown, the complaint arose from the pollution of a mill-race, which when drawn down was liable to engender disease.

At Rhinebeck, which has been before the Board for some time, the alleged insanitary conditions existing were first investigated by the drainage committee. Its report of the conditions prevailing in the coves cut off from the river by two railroad embankments and of the conditions prevailing in the neighborhood was such, that it was not possible to fix upon the coves complained of as the source of disease. The matter was referred to the sanitary committee as involving the question of the causation of disease. A number of conditions seemed to be acting to produce malaria in the neighborhood of Rhinebeck, and the views of the committee regarding them are set forth in the report.

A nuisance caused by the accumulation of logs off the shore of Grand island in the Niagara river, of which complaint was made on account of the legal questions involved, the matter has been referred to the Attorney-General for his opinion as to the powers of the State Board to act in this matter.

One of the most important sanitary investigations made under the committee was that at Gouverneur, St. Lawrence county, where Dr. Curtis found that cerebro-spinal meningitis and diphtheria were prevailing to an alarming extent. The cause of the disease appears to be directly traceable to soil saturation, and the question was, therefore, referred to the committee on drainage, sewerage and topography, in the report of which are given full descriptions of the case. The sanitary committee found that twenty-five per cent of the deaths from zymotic diseases can be prevented if proper sanitary measures be taken by the village.

Another very important case, involving the water supply of a large city, will be found in the report on the investigation of a water

supply for Syracuse. At the request of the citizens, the committee visited Syracuse and held a public meeting, where, in response to numerous questions, the committee gave their views respecting the methods of sanitary investigation necessary to pronounce upon the wholesomeness of a water supply. Entirely too much confidence is felt by the people at large in the results of chemical analysis of water. The dangers which threaten water supplies are by no means in direct proportion to the chemical purity of the water. It is the specific character of the polluting material more than its quantity that makes water dangerous. An examination, therefore, of all its sources of pollution is the most important factor in determining the sanitary character of a water supply. This principle, which has not been understood, the committee endeavored to explain and illustrate to the citizens of Syracuse. Such sanitary investigations of water supplies can only be made by persons of large sanitary experience with the knowledge and sagacity required to detect the possible dangers which threaten the purity of waters, or foresee those likely to arise in the future.

This question of the sanitary examination of potable waters, which has heretofore been largely left to the chemist in the laboratory, must, in the light of present knowledge, be treated in a far more comprehensive and thorough manner.

The question of the ice supply of Syracuse was also brought before the committee by its local board of health. The committee have not been able to make a final report on this question until analysis has been made of the ice cut from certain points which are described in the report.

A synopsis of the sanitary laws of Great Britain and the United States with the decisions of the courts on sanitary questions, compiled by Hugh Weightman, Esq., is also given and will be found of great value for sanitary purposes.

WOOLSEY JOHNSON,
Chairman.
ALFRED MERCER.

June 12, 1885.

Dr. ALFRED L. CARROLL, *Secretary of the State Board of Health :*

DEAR SIR — An application was received at the office, on the 10th inst., from the board of health of the village of Johnstown, through the health officer, Dr. J. E. Burdick, for inspection and advice from the State Board respecting an alleged nuisance in that village. In response to which I visited Johnstown the next day, and herewith report the conditions found, for your information and action.

Johnstown is one of the oldest incorporated villages in the State, the capital of Fulton county, and has a population of about 6,000. It is situated on rolling, hilly upland, having a clayey,

loam surface on a calciferous bed. Its business consists chiefly of the manufacture of leather and gloves. Three or four miles north of it is Gloversville, a village of 8,000 inhabitants. Both of these considerable villages are located on the Cayadutta creek, which rising in the northern part of the town empties into the Mohawk near Fonda, four miles south of Johnstown. This creek receives most of the sewage of Gloversville and also a part of that from Johnstown. Entering the corporate limits of the latter at the north-east, its bed passes southerly through the edge of the cemetery grounds, then turning directly west it traverses the village to the north of its most thickly settled portion and again turns southerly and passes out through the western part of the village. At the point where it turns west it receives the water of a small meadow creek just after it passes through a mill pond; also as it turns south the outlet of another pond empties into it, the water of which comes from another small brook.

At the northern village outskirts a dam is thrown across the Cayadutta creek and its water turned into a mill-race. This runs in a generally straight course for about half a mile west and the water passes into conduits under ground to several mills for the manufacture of leather, finally returning to the original bed of the creek below. It is this mill-race which is the source of complaint, on the ground that it is polluted by sewage along its banks and from Gloversville above. It has existed for its present purpose for very many years.

At the time of my visit this race diverted all the water of the creek, none passing over the dam; this is generally the case. The artificial channel is about ten feet wide and the bottom was entirely covered except at a few points where the edges for a certain distance being shelving, the ground is marshy. On one side the bank is abrupt and well kept; on the other, the land not being owned by the company, it is uneven, much of the way grown up with bushes and often marshy. The water is of a brown dark color, but transparent, although carrying in suspension particles of dark-colored, apparently vegetable material. It has much the appearance of water flowing from a peat swamp, but the color is said to be due to the water from tanneries flowing into it and the dye-stuff of leather. The channel has a fall of perhaps two feet in its entire course, and the flow is moderately rapid, water being nowhere stagnant; it was perhaps two feet deep in mid-channel. The entire amount passes at its head through a circular conduit two or three feet in diameter. The bottom is muddy with silt, and it requires cleaning out once in two or three years. Long grasses grow in it beneath the water. The first half of it runs through pasture land, no houses being near. It receives a few house drains, to be seen projecting into it. Further down a horse-car barn is immediately on its bank, leachings from which and a large manure pile pass directly into it. A little further, drippings from an ice-house keep the ground wet, and there is another barn and yard for hens, all on the edge of the bank. Then, a shallow ditch for carrying surface water

causes a set-back for some distance and the bank is flat and marshy and grown up with flags. One or two privies are upon the edge of the bank and a few more house drains empty into it. There are not many dwellings near, however, as it runs through a sparsely-settled outskirt of the village. Toward the lower part of its course refuse matter and tin cans are observed in the bottom. There is also considerable floating material, sticks and vegetable matter mostly. At its terminus a strainer arrests these, and it is found necessary to remove them very frequently.

You will observe the points of danger are, the sewage from above, that from several houses, and the pollution from barns, privies, etc., on the bank. Then there is the silting up of the bottom, the refuse waters thrown into it, and the irregularity of the bank on the north side.

Another point, not alluded to, is also the exposure of the bottom by drawing off the water below a safe level. This I am told occurs when there is low water in the summer time. A resident informed me that at such times there is a green scum on the water, the bottom is uncovered and the smell very bad. This was the case in the neighborhood of the horse-car barn. At the time I saw it there was nothing offensive about the stream.

There appears to me little serious ground for complaint as to the condition existing at the time of my inspection, but there is a good deal of possible evil in it which should be certainly guarded against. Being in a quite sparsely-inhabited outskirt of the village the problem is simplified since there are fewer exposed to it and less chance for its pollution. There will come a time with the expansion of the village when it will be necessary to convey this water in a closed pipe to the mills. For the present it appears to me that with a few less radical precautions the present mill-race will be safe. The faulty bank should be rectified at all the points where it is irregular and sloping. The entire channel is much wider than is necessary, but could not probably be narrowed except by stone work, as the banks would wash. But the present banks should be made abrupt and the soakage in the soil, making marshy places with more or less contaminated water, should be at once rectified. For the purpose of not impeding the current overhanging bushes should be trimmed away. All coarse refuse should be removed, such as cans, hoops, and similar waste. The bottom should be cleaned every year; it is questionable whether it would be safe to expose it during this summer weather.

Besides these improvements of the channel certain regulations ought to be adopted. (*a*) The water should, under no circumstances, be allowed to be drawn off so as to expose the bottom to any degree. (*b*) House drains should not be permitted to empty into it. The village is supplied with sewers as well as with an excellent public water supply, and connection could probably be made with them for all premises needing sewerage. (*c*) The pollution of the water by

the barns and privies on its bank should be at once stopped and all present accumulations from them should be cleaned up. Little account need be taken of the Gloversville sewage; the defilement comes from these sources nearer home. (*d*) Refuse matter should be kept out by prohibition and by frequent inspection and removal. With these precautions I think little danger need be apprehended from this mill-race.

While this was the principal object of my going to Johnstown, my attention was called to a few other insanitary conditions, some of which I gave verbal advice concerning.

There is an offensive way of disposing of the waste from these leather mills. It runs out into rough, stony and clogged-up open drains along the sides of the street. Being composed of chemicals, dye-stuffs and animal refuse an unhealthy effluvium must arise from it in hot weather. Closed drains ought to be provided, or at least some attempt should be made to provide a smooth channel on the surface.

Two mill-ponds and the portion of the Cayadutta creek bed that is part of the time dry may also require consideration. For the present, however, they do not call for reference in this report.

Respectfully submitted,

F. C. CURTIS.

REPORT ON THE SANITARY QUESTIONS INVOLVED IN THE CONSIDERATION OF THE COVES NEAR RHINEBECK.

To the Sanitary Committee:

The condition of the coves which form the subject of the report of Mr. Andrews, published in the fifth annual report of the State Board of Health, and their influence, if any, upon public health, was brought before the Board in 1883, and referred for investigation and consideration to the committee on drainage, sewerage and topography. The conclusions of the committee then were, that since malarial fevers had been known to prevail along the Hudson river for very many years, the building of the railway could not have been the only factor favoring the development of the disease; and, as it was necessary to have reasonable assurance that the suggested improvements in the construction of the embankments were necessary for the preservation of life and health before recommending the issue of an order by the Governor, the Board confined itself to advising that the railway companies should be requested to make proper provision for a freer movement of water in order to allow the egress of any floating dead vegetation which might accumulate within the coves. This action was taken from a purely engineering point of view, and the investigation on which it was based was limited to the specific question presented by the Governor, to whom the original complaint was addressed; the State Board not being authorized to extend its inquiries to other probable causes of endemic disease, and being unwilling to commit itself to a positive opinion on the etiological aspect of the problem.

A later appeal, made directly to the State Board for advice as to the sanitary questions involved, however, necessitated a wider examination; last autumn I accompanied Mr. Gardiner in a more comprehensive tour of inspection, embracing the telluric environment of the houses where malarial disorders were alleged to have been most severe.

The first fact elicited was, that paludal fevers were common over a wide region of country, extending some miles back from the shore, and in nowise to be ascribed, by any stretch of imagination, to influences arising from the river front. It was also evident that in these instances, as in the few houses on the margin of the coves, other conditions existed fully capable of giving rise to malaria.

The embankment of the H. & C. W. R. R., on the eastern side of the north cove, shuts in a sort of ravine parallel with the shore, which probably formed the bed of the brook that is now turned

through a small culvert further to the north. In this ravine, dead vegetation had accumulated to a considerable depth, and in rainy seasons must be placed under the most favorable conditions for fermentation. A depression running first easterly and then southerly from this point, and receiving the drainage from a wide water-shed, constitutes a veritable marsh throughout which the ground water stands actually at the level of the soil; and even on the adjoining places at a higher elevation, the wells which we examined were filled to within three or four feet of the surface. Still farther back, on the plateau whereon the village of Rhinebeck stands, and, indeed, wherever malarial disorders were said to exist, we found the same condition of soil saturation. On the shore of the cove itself, the dead vegetation was almost entirely of land origin, and was hardly sufficient in amount to occasion deleterious emanations.

As far as observation of the causation of malaria has extended, there is reason to believe that the poisonous ferment is generated rather by the decomposition of vegetable matter in a damp soil than on the surface, or where submerged; and experience warrants the opinion that flooding a miasmatic district is sometimes as effectual a remedy as draining it. Living submarine plants, of course, are not to be regarded as injurious to health, and it may be doubted if they can exert a seriously detrimental influence, even after detachment from their roots, while floating on water which is not stagnant, although if stranded on the shore in considerable quantity their decomposition might be hurtful. Hence, while not denying the possibility that under certain circumstances the condition of the larger coves might conduce to the perpetuation of malaria, other and more potent agents are so evident that these cannot be condemned from a purely sanitary standpoint, however objectionable they may be in other respects.

The case, however, is different as regards the smaller pond inclosed by the embankment of the H. & C. W. R. R. The culvert here is, according to both engineering reports, insufficient to permit free circulation of water, and, in addition to the vegetation decaying *in situ*, much drainage from buildings on the shore is received in the almost stagnant basin, the effluvia from which are very offensive, and doubtless capable of injuring health. It would seem reasonable to demand that the railway company provide for proper circulation of the water in this cove, but beside this measure, the local board of health should prevent the discharge of any organic refuse into the basin, and compel the riparian owners to remove nuisances from their own premises. The effectual abatement of malarial endemic fevers depends upon drainage of the saturated land bordering the coves rather than upon any operations relating to the water. The very term "marsh miasm," commonly applied to the malarial ferment, indicates the universal experience of the pre-eminent agency of soil-saturation in inducing the disease; and wherever thorough drainage has been accomplished, malarial fevers have been abolished.

ALFRED LUDLOW CARROLL, M. D.

The sanitary committee, to whom the reconsideration of the former reports on the condition of the above described coves was referred, concur in the views expressed by Dr. Carroll, and in the suggestions made for the improvement of the public health in that vicinity; and, as regards the smaller pond, recommend the adoption of the measures set forth in the report of Mr. Andrews, as published in the fifth annual report of the Board, namely: that, in addition to providing freer circulation of water, "the low places on the shores be filled as rapidly as possible, thus diminishing the area to be kept clean."

WOOLSEY JOHNSON, M. D.,
Chairman
ALFRED MERCER, M. D.

REPORT ON DIPHTHERIA AT GOUVERNEUR.

To the Sanitary Committee, State Board of Health:

Gouverneur is a rapidly-growing village of nearly three thousand inhabitants in the south-western part of St. Lawrence county, about thirty-five miles from Ogdensburg. It lies on both sides of the Oswegatchie river, a rapid and considerable stream, extensively used for lumbering, and at this point for mill power, flowing between banks that are abrupt and well elevated about fifteen feet above the stream. The country about is uniformly level, rolling land, the surface soil being alluvial sand and quick sand, not fertile; the under-lying rock is lime-stone which crops out near the village; above it is clay having an average depth beneath the surface, I was told, of some ten feet. The site of the village is broken by slightly elevated ridges, and one or two small streams flow through it, maintained by neighboring springs, on either side of the river into which they empty. Formerly forests of cedar and hemlock covered this locality; farther up the river there are said to be peat bogs from which some of its tributaries flow. Throughout this township and much of this region there is a remarkable degree of soil saturation. In most places, regardless of topography, water is reached within two feet of the surface; consequently throughout a considerable portion of the village, many of the cellars contain standing water, especially during wet weather; some of them are always wet. The wells throughout the village are sunk probably through the clay, and are from fifteen to forty feet deep, their contents rising pretty near the surface.

There is but one sewer in the village, in the main street, said to be the healthiest part. There is a public water-supply, but it is not used to any great extent, from popular prejudice. The water is slightly stained of a brownish color, probably from vegetable matter, but the taste is not unpleasant. It is taken from the river directly above the dam, at the center of the village, the stream being set back a considerable distance between the high banks.

In the monthly bulletin of this Board, the mortality of the town of Gouverneur has been recorded since May, 1884, with the exception of one month. In seventeen months one hundred and fifty-six deaths occurred. This represents an annual death-rate per thousand inhabitants of twenty. Of these, thirty per cent were under the age of five years. Of the number, eleven deaths were from cerebro-spinal fever, two from typhoid fever, one from measles, seventeen from scarlet fever, nineteen from croup and diphtheria, and nine from diarrhœa, making a total of fifty-nine deaths from zymotic or preventable diseases.

This, it will be observed, amounts to nearly thirty-eight per cent of

the total mortality. During the same period the percentage of zymotic disease mortality for the entire State amounted to 25.9, which, including the cities of the State with their large summer mortality from diarrhœa, is considerably higher than it would be if only the rural population were taken. This mortality in Gouverneur is principally made up of cerebro-spinal fever, which occurred in almost every one of the months referred to, but has been much more prevalent since January last; of scarlet fever, which prevailed from December to May last; diarrhœa, occurring only in the summer months; and croup and diphtheria, which in our sanitary records are classed together on account of the frequent difficulty of distinguishing them apart, and which began to cause deaths in December, 1884, since which time there are but two months in which they failed to occur. It should also be noted that there were seventeen deaths from consumption during the period of time. About fifty per cent of the mortality occurred from zymotic diseases and consumption, or in other words, nearly half the deaths were from consumption, cerebro-spinal fever, scarlet fever, croup and diphtheria and diarrhœa.

This has been the reported mortality of the entire town; for the village alone all these proportions would be exaggerated, since beyond doubt most of the preventable deaths occurred in it.

December 4, in response to the representations of certain citizens of the village to the effect that diphtheria was alarmingly prevalent, and on the invitation of the local board of health, I went at the request of the Secretary of this Board, to investigate the facts and conditions at Gouverneur, in company with the health officer of both the village and town boards, Dr. J. B. Carpenter. Our inquiry was limited to the village, although the disease has prevailed throughout the town to less extent.

From him I learned that fifty-two cases of the disease had been reported to the town board since July last, and eleven deaths had occurred. The disease had culminated early in November, when four deaths occurred; for about four weeks there had been no deaths, and at the time of my visit there were but two persons sick with the disease.

Of the reported deaths under the head of croup and diphtheria, part were attributable to the former disease. This epidemic came on with, or followed after, one of scarlet fever, which, as noted above, prevailed from December to May last, and which was attributed to an imported case. Care had been taken to quarantine and afterward to fumigate in all cases known to the Board, and all children from families where the sickness occurred were excluded from school. With Dr. Carpenter I visited premises where cases existed or had been. The disease first extensively prevailed in a row of tenement-houses on the south, or less built up part of the village. Here the sanitary conditions had been very bad; the cellars were full of water, which had increased by recent rains; a single large privy, used by several families, was in a foul state, and

all garbage and slops were thrown on the ground about the house. At this locality all this had been rectified under direction of the Board, the cellar being easily drained into an adjacent streamlet — since then no cases had occurred.

A similar experience attended another row of tenements in the same neighborhood, and subsequently cases developed in various parts of the village.

Without speaking in detail of these I will present what appeared as the possible and suspected causes of the prevalence of the disease.

First, in regard to the drinking water. As already remarked, the village has a public supply, taken from the Oswegatchie. It is pumped from the river just above the dam, which is about midway of its course through the village. The stream always contains quantities of logs, above and below the dam, and some of the citizens have thought that these were a source of unhealthfulness. However this may be, I see no reason why it should contribute in any way to causing diphtheria. But the stream may be polluted by the organic waste from the village. At present the only village sewer, and also the largest of the little streamlets which traverse the village empty into it below the dam; but some of the house waste already finds its way into the stream above the dam, and eventually a considerable amount will be likely to, as the village grows. Worse than this, however, the village cemetery is immediately on the south bank of the river, its area elevated and sloping rapidly toward it. Probably many of the graves extend below the ground water level, and at any rate the drainage is ultimately into the stream. It is only eighty or 100 rods above the intake. This cannot, therefore, be recommended as a safe place to take water; but as to its present condition Dr. Hailes will report a biological examination of a sample which I procured. I know of no objection to the purity of the water taken from a point above the village. The water is, however, objectionable to the people, and is but little used. As to its entering as a cause of the diphtheria, I ascertained that only two or three families that had been afflicted made use of it, and the first cases of this immediate prevalence occurred on the south side of the river, which has no public water supply. It is undoubtedly safer water than that of the village wells, which are sunk into soil admitting of such ready pollution. A sample from one of them will also be reported on by Dr. Hailes.

The high level of the ground water is in my opinion, as also of health officer, Dr. Carpenter, the most important element in maintaining diphtheria here. It is oneof the recognized causes of the disease, as is shown by numerous studies of its development, among which reference may be made to a report to the Massachusetts Board of Health, in 1876, by Dr. J. G. Pinkham, of an epidemic in Lynn, where eighty per cent of the cases occurred on damp, undrained soil, and especially to the more recent report of Mr. James T. Gardiner to the New York State Board, of which he is the consulting engineer (see Fifth *Annual Report*), *upon an epidemic* in Ogdensburg,

where almost identical conditions existed as here. The dampness or flooding of cellars resulting from high ground water acts, as Mr. Gardiner suggests, in two ways: by predisposing to a catarrhal condition of the air passages, which renders them more vulnerable to diphtheria, and, also, by poisoning the air of the dwelling with decomposing matter carried in with the soil water. A little reflection on the part of the villagers will convince them of the reasonableness of this. Having no sewers, all slops and excremental matters are deposited on the ground about the dwellings. Kitchen waste is thrown generally upon the surface, and privy accumulations are either on the surface or in a shallow pit often containing soil water, for I believe no sort of removal system is attempted. In such a porous soil these sink readily, are soon taken into solution in the ground water and find their way into the cellar or the well. In the former case there is every facility for decomposition to take place, and the upward draught of the warm air above distributes the products of decomposition through the dwelling.

That this is a very important element in the existence of diphtheria in Gouverneur is seen from the fact that a large proportion of the cases have occurred in houses in which there has been standing water in the cellars. In others, where there is no actual standing water, it will, no doubt, be found that there is an unhealthy degree of moisture in the bottom and sides of the cellar. It is further seen from the fact that it disappeared from the tenement-houses, where it first broke out, as soon as drainage of the cellars was effected, and on the main street, through which there is a sewer and the cellars are dry, only two or three cases have been found, and these, there seems good reason to believe from what I learned, were traceable to the third apparent element in the production of the disease in the village — contagion. This was generally guarded against by the management of the Board, but one case failed of being reported to them, and from it the disease was taken to the schools. One of the children taken with the disease on Main street sat beside a child from this family.

Some of the cases were not traceable to either of the causes I have mentioned, and were due I believe to local insanitary conditions, in which probably the well water had a part. I found a case already existing and the third or fourth case in the family. The house was very dilapidated; the well close by the kitchen door, outside of which slops were thrown, and fifteen or twenty feet away was the privy and a stable. (See report of Dr. Hailes upon this water.) The premises have a bad sanitary record of typhoid fever and other zymotic diseases. Every epidemic of diphtheria of long duration shows instances similar to this, the local insanitary conditions finding expression in the prevailing epidemic by preference.

My conclusion is that the prime factor in the prevalance of diphtheria in Gouverneur is the remarkable high level of soil water. This is, to be sure, no new thing here, neither is the disease. Dr. McFalls, who has practiced there for many years, tells me that the

disease has prevailed for a long time, not only in the village but in the surrounding country, where similar conditions exist. During the past season this has been intensified by unusually wet weather. By reason of it, as Dr. Carpenter states, the potato crop has been a failure, these and other vegetables rotting in the ground. It is further increased by the very rapid rate at which the village is growing, for in few places have I seen so many houses new or in process of erection. It is further shown, I think, by the considerable death-rate from consumption, and in the same connection the unusual number of deaths from cerebro-spinal fever, here and elsewhere in this region, is of interest. In the forthcoming sixth annual report of this Board, the Secretary, Dr. Carroll, calls attention to soil saturation as the best established factor in the causation of the latter disease, very clear evidence of which appears in Dr. Meredith Clymer's study of the outbreak of it in New York in 1872. With a high death-rate, nearly half the mortality has been from diseases that may be considered more or less preventable. And they are deaths that, as far as we know them, are especially preventable by drainage and cleanliness. Whatever else may enter into the causation of diphtheria and other diseases here, I have no hesitation in saying that drainage of the soil and lowering the water in it to a safe level below the cellar bottoms is the first necessity. How this may be effected, and to what extent a system of sewerage which is likewise desirable might be added to it, I will not undertake to speak of, as advice in this should be given by a civil engineer. I am sure, however, that a remedy is very feasible from the topography of the village.

With regard to the public water at present in use, while it does not seem to be an evident cause of prevailing disease, there is reason to believe that it is already to some degree polluted, and with the increase of the village, the introduction of sewers and the growth of the cemetery it would become more so, taken from the present point. It would be much better to take it from some point entirely above the village, where the current is rapid, the animal waste entering it slight in amount, and the water doubtless wholesome and good. Of this I have no knowledge, however, from personal observation, and perhaps some more desirable source may be found to take the place of the present, which cannot be commended. With these improvements the death-rate of Gouverneur would be materially diminished.

Throughout the township the same condition of soil saturation undoubtedly exists, and has the same bearing on the production of diphtheria, some of the cases of which, reported in the bulletin referred to in this report, occurred outside the village limits; the remedy is the same for the isolated farm-house as for the village residence, and is feasible generally, or ought to be, to make the house fit for habitation.

Respectfully,
F. C. CURTIS.

ALBANY, *December* 10, 1885.

Dr. A. L. CARROLL, *Secretary State Board of Health:*

DEAR SIR — Upon biological examination of the specimens of water sent to me from Gouverneur, I respectfully report as follows:

LOCALITY.	Date of culture.	Time of first appearance of micro-organisms.	Time of beginning of liquefaction of gelatine.	Extent of liquefaction in four days.	Chlorine in parts of 100,000.	Observations
Hydrant water, Oswegatchie river.... ...	Dec. 7..	36 hours..	3 days..	3-4 inch.	1	Micro-organisms quite numerous.
Hydrant water, Oswegatchie river.........	Dec. 7..	36 hours..	3 days..	1-2 inch.	1	Micro-organisms quite numerous.
Water from tenement-house, Wm. Whitney.	Dec. 7..	24 hours..	2 days..	2 inches	10	Micro-organisms exceedingly numerous and liquefy gelatine rapidly.
Water from tenement-house, Wm. Whitney.	Dec. 7..	24 hours..	2 days..	2 inches	10	Micro-organisms exceedingly numerous and liquefy gelatine rapidly.

The water from the tenement is very bad — ten parts of chlorine, and the bacteria exceedingly numerous and active. The river water is better; possesses very small proportion of chlorine (one part) but it cannot be recommended with safety on account of the short time required to liquefy the gelatine (three days) and the number and activity of its micro-organisms.

Very truly,
WM. HAILES.

REPORT OF THE SANITARY COMMITTEE ON THE INVESTIGATION OF A WATER SUPPLY AT SYRACUSE.

To the State Board of Health:

The common council of the city of Syracuse, on the 23d of March, 1885, passed an ordinance granting to "the Central City Water-Works Company" a franchise for supplying the city of Syracuse with water which, "upon analysis by the State Board of Health, shall be pronounced to be pure and wholesome."

This was practically a request from the city of Syracuse that analyses should be made of the water proposed to be furnished, and that this Board should state whether these chemical analyses showed the water to be up to the standard of purity as commonly accepted for potable purposes.

Doubtless the object of this request was that the analyses might be made by such men and such methods as this Board is in the habit of employing in its chemical analyses of water.

Under this view of the case the Board caused seven samples of water to be analyzed, taken from the Oneida lake; two by Prof. Willis G. Tucker, of Albany, and five by Prof. S. A. Lattimore, of Rochester University. The results of these analyses are herewith appended. They show that in parts by weight per hundred thousand the results range as follows: Total solids, from 14.22 to 16.80; chlorine, from 0.32 to .454; free ammonia, from trace to .0027; albuminoid ammonia, from .002 to .0045.

Certainly on chemical grounds *alone* no exception could be taken to the samples of the water analyzed; and, in response to what the Board interpreted to be a request from the common council of Syracuse, a resolution was passed at the meeting of the Board on November 16, 1885, stating that these analyses had been made by the official analysts of the State Board of Health, and that the water, according to accepted chemical standards of analysis, was found to be pure and wholesome.

It was not to be supposed that because the water was pure from a chemical standpoint, that, therefore, from a sanitary point of view it was proper as a water supply for the city of Syracuse. In the discussion at the meeting previous to the adoption of the resolution the Board was unanimous in the opinion that a chemical test is but one of the methods necessary to determine the potability of a water; nor did the Board express any opinion as to whether the chemical condition of the water of Oneida lake, at the time the samples were taken, would be its uniform condition the year through. All that the resolution was intended to express was the fact that the samples analyzed were pure according to received chemical standards.

Notwithstanding the careful wording of the resolution expressly limiting its meaning, it was found that its scope was misunderstood both by the common council of Syracuse and by the citizens at large.

The citizens' committee of Syracuse then requested a full investigation and explanation of this subject by the State Board of Health; in response to which this committee, having been empowered by the Board, held a public meeting in the city of Syracuse, December 8, 1885, of which due notice was given to all parties interested, in order that a more correct understanding might be arrived at regarding the wishes of the citizens of the city of Syracuse, and the views of the Board with reference to the sanitary examination of water supplies.

The town hall was secured by the citizens for the meeting, and its management was assumed by a citizens' committee. Your committee was represented by the President, Dr. Edward M. Moore, the Secretary, Dr. Alfred L. Carroll, together with Dr. Alfred Mercer and consulting engineer James T. Gardiner.

At half-past ten A. M. when the committee arrived at the hall, it was well filled with members of the common council and other prominent citizens, his honor the mayor being also present. The meeting was presided over by Mr. Duguid, president of one of the city banks.

As the citizens desired to know exactly what the State Board had done in the matter, President Moore explained the action above described, and in answer to numerous questions, the views of the Board with regard to the sanitary examination of water supplies were set forth by Dr. Moore, Dr. Carroll and Mr. Gardiner. The recommendations of the committee with regard to the leading outlines of the sanitary examination of a potable water supply were as follows:

1. Before any supply of water can be pronounced pure and wholesome for a city's use, it should be submitted to chemical analysis, the samples being taken at such times during the year and during such varying conditions of the water as would represent the chemical character of the water in its principal changes.

2. It should be submitted to biological analysis, the samples analyzed being taken at all seasons of the year and in all conditions of the water, when these conditions are quite variable.

3. Sanitary examination should be made to determine all the sources from which impurities may reach a water supply, and the question of a probability of its remaining pure in the future, and the possible means of sanitary protection of the water should be carefully considered. This sanitary survey is considered the most important of all.

CHEMICAL ANALYSIS.

By chemical analysis and the examination of the chemist there may be determined the amount of mineral matter in the water and its character. Whether the water is a hard or a soft water, and the degree of hardness may be estimated. A part of this analysis of the mineral constituents is the determining of the amount of chlorine, which is sometimes an indication of the amount of sewage pollution of water.

The amount of putrescible organic matter in the water may also be approximately determined; and analysis will often indicate whether the water contains the products arising from putrefaction. The character also of the organic matter in the water is sometimes indicated by the analysis. The color of the water and its taste and odor may also be made the subjects of examination in the chemical laboratory. In general, therefore, the examination of water by the chemist determines its hardness, the amount of organic matter liable to putrefy which it contains, its taste, odor and color, and sometimes the character of the organic matter in solution.

While these facts are of great importance, they are by no means the only things it is necessary to know before declaring a body of water to be a wholesome supply for city purposes or for potable uses. Chemistry cannot determine whether water contains those micro-organisms or bacteria which are the cause or carriers of disease. It can rarely determine the source of the contaminating matter found to be present. Some of the most severe epidemics have been caused by water where the actual amount of organic matter was exceedingly small. Frankland, the celebrated English sanitary chemist, having carefully analyzed a measured quantity of water, added to it one-thousandth part of its volume of the dejecta of a cholera patient, and was unable, by chemical analysis, to detect any difference that would have awakened suspicion of danger. This experiment of Frankland's well illustrates that a water may be freighted with the fatal germs of disease and yet chemistry be unable to reveal it.

BIOLOGICAL ANALYSIS.

Biological analysis has recently been brought into use as a method of determining approximately the amount of bacterial life contained in the water. This is accomplished by putting into a sterealized gelatine solution a drop of the water to be tested, and excluding the air. Where the water contains a large number of spores or developed bacteria their rapid multiplication soon breaks down the gelatine solution. It is assumed that the relative rapidity at which the gelatine solutions are broken down and the comparative number of bacteria produced are a measure of the relative number of bacteria contained in the different waters tested.

While the biological analysis of water is as yet too new to be an absolute guide, yet its results may throw much light on the question of the sanitary character of a water supply. But notwithstanding the valuable aids of chemistry and biology in determining the purity of water, it is clearly proven by the history of disease that a supply of potable water for a city might be in serious danger of creating an epidemic and yet that fact not be discoverable either by chemical or biological analyses. The *sanitary survey of the water-shed and sources from which the water is derived is often the most important method of determining the wholesomeness of the water.*

SANITARY SURVEY.

In a sanitary survey the geology and topography of the water-shed and the artificial and natural storage basins are considered in connection with the uses made by man of the water-shed and water-courses. The disposal of all human and manufacturing wastes is examined in its relation to the water supply; and should it be found that objectionable matter is likely to reach the proposed water supply, the possibility of protecting the water from such pollution, both in the present and future, is carefully considered.

The sources of pollution of water may not be constant, but may be operative only at certain seasons of the year. Where such conditions are suspected it is necessary to examine the waters throughout the season. Some lakes, the water from which is perfectly palatable through the autumn, winter and spring, are liable during the summer to the growth of low forms of vegetable organisms in such quantities that their decay imparts to the water a most disagreeable taste and odor. In comparing a number of water supplies, while chemical analysis may determine the chemical purities of the waters to be compared, it by no means follows that the water chemically purest is the best. A sanitary survey is necessary to determine the sources of these impurities; for the one least in amount may possibly be the most dangerous.

The water which was determined to have produced the epidemic in Plymouth during the past year was chemically the purest of the three sources of supply for that town. The epidemic was traced to the excrement of one typhoid patient being thrown upon the snow and washed into the stream which supplied the reservoir.

There are around Syracuse a variety of sources of water supply of greater or less value from an engineering and sanitary point of view. Each of these is probably liable to its particular class of dangers which may occur at different seasons of the year.

The city is, of course, desirous to secure the best water. The only method of determining which is the best among these sources which are admitted to be practicable from an engineering and financial standpoint, is to thoroughly examine them by chemical, biological and sanitary means at the seasons when the special weaknesses of each supply are likely to be most fully developed.

To complete a work of such magnitude in a thorough manner and prepare an exhaustive report would doubtless require a year; but without such complete survey the State Board of Health would not be willing to pronounce any one of the water supplies as most desirable for the city of Syracuse from a sanitary point of view.

In response to the question whether the State Board of Health would be willing to undertake to examine the possible water supplies of the city of Syracuse, and report to the city the best one from a sanitary standpoint, President Moore replied that the Board would undertake the work, provided they were requested to do so by the common council of the city, and provided the appropriations by the Legislature were sufficient for the purpose.

As regards the possibility of the purification of the water it was

stated by the committee that the grosser particles in suspension in water might be removed by filtration, but that impurities in solution and micro-organisms, which are the carriers of disease, could not be so removed with any certainty in treating water on a large scale through a series of years. While laboratory experiments have been successful, the efforts made in this direction in treating large quantities of water have eventually been failures.

The question was asked the committee, whether from a sanitary point of view it was more desirable that a water supply should be under the control of the city rather than the property of a private company. President Moore answered that the committee would prefer to consider this matter before answering. The committee have considered the question, and after reviewing the experience of the various towns and cities, whose water supplies have come under the observation of this Board, they are of the opinion that as a general rule where water supplies are directly under the control of those most interested in their purity, that the purity of the supply has been most carefully guarded; and that where the water supply has been either endangered or its quality deteriorated, it has been most easy to make the necessary changes, or to carry out plans for protecting the water when the supplies have been under municipal management.

Respectfully submitted,

WOOLSEY JOHNSON, *Chairman.*
ALFRED MERCER, M. D.
EDWARD M. MOORE, M. D., *President.*
ALFRED L. CARROLL, M. D., *Secretary.*

ROCHESTER, N. Y., *October* 14, 1885.

DR. A. L. CARROLL, *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR — I received from Dr. Alfred Mercer, of Syracuse, October 6th, four samples of water for analysis. The labels indicated that they had been taken at Shakelton's Point, Oneida lake, 1,000, 2,000, 3,000 and 4,000 feet from shore, at the bottom of the lake. The samples are designated below by the numbers 1, 2, 3 and 4, respectively. The analysis gives the following results :

Parts per 100,000 *by Weight.*

	No. 1.	No. 2.	No. 3.	No. 4.
Total solid residue..........	14.23	14.22	14.21	14.23
Chlorine..................	0.454	0.452	0.453	0.454
Ammonia, free.............	0.000	0.000	0.000	0.000
Ammonia, albuminoid.......	0.002	0.002	0.002	0.002

In each sample animalcula were present, of the class of entomostraca common to all our lake waters. The microscopical examination revealed a number of species of plants and animals invisible to the unaided eye, but of the same species as those found in Hemlock lake, from which this city is supplied, and in other lakes of western New York.

Both the chemical analysis and the microscopical examination show that these four samples are identical in character. The minute life is such as is common in all pure waters exposed to the air and sunlight, while the chemical analysis shows its suitability for domestic use. The solid residue — eight and a quarter grains per gallon — consists chiefly of calcium carbonate and renders the water slightly hard.

ROCHESTER, N. Y., *November* 9, 1885.

Dr. A. L. CARROLL, *Secretary State Board of Health, Albany, N. Y.*:

DEAR SIR — On the 6th inst. I received a sample of water, accompanied by a letter, from Dr. Alfred Mercer, requesting me to filter a part of the water and make separate analyses of both the filtered and the unfiltered portions. The water was clear, and a few white animalcula were the only floating objects visible to the eye. The following are the results in parts by weight for 100,000:

	Filtered.	Not filtered.
Total solid residue	14.5	14.5
Chlorine	0.45	0.45
Ammonia, free	trace	trace
Ammonia, albuminoid	0.002	0.002

The microscopic examination showed a few entomostraca and a few other minuter forms of life such as are common in the lakes of western New York.

Very respectfully,
S. A. LATTIMORE,
Analyst, S. B. H.

ANALYSIS OF ONEIDA LAKE WATER.

ALBANY MEDICAL COLLEGE, *November* 10, 1885.

Received from Dr. A. Mercer, Syracuse, N. Y., November 5, 1885:

FILTERED WATER.

(*Parts per* 100,000.)

Color and appearance	Light greenish tint.
"	Transparent.
Odor at 100 degrees F	None.
Chlorine	0.32
Free ammonia	0.0027
Albuminoid ammonia	0.0035
Total solids	16.40
Loss on ignition	5.20
Mineral matter	11.20

CONCLUSIONS.

This (filtered) water differs but little from the unfiltered. Judged by these analytical results it is of good quality, but in order to form a positive opinion as to the quality of a large body of water, numerous and more elaborate analyses should be made. The above form was adopted more particularly with a view to the examination of private supplies.

WILLIS G. TUCKER,
Analyst.

UNFILTERED WATEI

(*Parts per* 100,000.)

Color and appearance	Light greenish tint.
"	Transparent.
Odor at 100 degrees F	None.
Chlorine	0.32
Free ammonia	0.0027
Albuminoid ammonia	0.0045
Total solids	16.80
Loss on iugnition	5.20
Mineral matter	11.60

CONCLUSIONS.

The color, appearance and odor of the water are unobjectionable; chlorine is low, and free and albuminoid ammonia are low. Total solids and loss on ignition not excessive. Judged by above analytical results, the water is of good quality.

WILLIS G. TUCKER,
Analyst.

To the Sanitary Committee:

The question of the purity of the ice of Onondaga lake having been referred to me, I took occasion at the meeting of the sanitary committee on December 8th, to have a hearing of all parties interested in the matter. Ice for the use of Syracuse is furnished to several parties; Sawmiller, Knapp and others are among the ice men. The ice is cut from Onondaga lake, Oneida, Cazenovia and Cayuga lakes, and from several points on the Erie canal.

It appears that the city board of health, on the recommendation of Dr. Englehardt, forbade Messrs. Sawmiller Bros. from selling, for purposes where it comes in direct contact of food or drink, the ice cut from Onondaga lake. This firm claimed that such action was unjust, as the ice sold by them was pure, and no more subject to sanitary condemnation than much of the other ice sold in the city.

The request for an examination of the subject by the State Board of Health comes from the city board of health of Syracuse. I have already made personal examination of the sanitary condition of most of the waters flowing *into this stream; such* additional knowledge

as was needed I obtained from witnesses at the hearing on December 8th. The principal stream entering Onondaga lake in the city of Syracuse is Onondaga creek, into which flow all the principal sewers of the city. An examination of the condition of this stream proves that its waters are very grossly polluted.

Onondaga is a small lake and quite narrow. A large proportion of its water is derived from Onondaga creek; the ice of the creek is, therefore, open to suspicion; but no positive judgment can be made of the degree of pollution of the ice without a series of analyses of samples of ice cut from the lake at properly selected points.

Samples of the water at the points where the ice is cut should also be taken. I, therefore, advise that the committee recommend the city board of health of Syracuse to have a specimen of ice cut at the point where Onondaga creek enters the lake; another specimen two thousand feet north of this point; another two thousand feet north-west of the last point, and two more specimens within the next mile, in the direction of Liverpool, and that specimens of the water from the lake be taken at such point where the ice is cut.

The specimens should be carefully labeled when taken, to insure that the position of each is a matter of certain record. The city board of health, however, should have these samples submitted to chemical and biological analysis by the analyst of the State Board of Health, in Albany. When the results of the chemical and biological analysis are at hand, and specimens of ice and water taken in the manner above described, it will be possible to form an opinion as to the safety of using the ice from Onondaga lake, as a supply for the city of Syracuse.

JAMES T. GARDINER,
Consulting Engineer.

The sanitary committee hereby approve the report of consulting engineer Gardiner, and advise that its recommendations be adopted by the Board and transmitted to the city board of health of Syracuse.

WOOLSEY JOHNSON,
ALFRED MERCER.

At a special meeting of the State Board of Health, on the 14th January, 1886, the report of the sanitary committee on the investigation of the water supply of Syracuse was adopted.

ALFRED L. CARROLL, M. D.,
Secretary.

January 15, 1886

THE SANITARY LAWS OF THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND, ALSO OF THE UNITED STATES OF AMERICA, AND OF THE IMPORTANT STATES OF THE UNION, TOGETHER WITH CASES DECIDED IN BOTH COUNTRIES ON DISPUTED POINTS ARISING OUT OF THE RIGHTS AND DUTIES OF BOARDS OF HEALTH, WHETHER SPECIFICALLY CONSTITUTED AS INDEPENDENT BODIES, OR AS FORMING PART OF THE AUTHORITY IN WHICH IS VESTED THE GOVERNMENT OF CITIES, TOWNS AND VILLAGES AND RURAL COMMUNITIES IN BOTH COUNTRIES.

By HUGH WEIGHTMAN, M. A., of the University of Cambridge, England, author of "The Laws relating to the Medical Profession."

THE LAW OF THE UNITED KINGDOM OF GREAT BRITAIN AND IRELAND ON THE SUBJECT OF THE PUBLIC HEALTH.

The doing of any act by which the public health might be endangered, whether by the propagation of an infectious disease, or by erecting any establishment which might corrupt the air by noxious exhalations, was ever a great misdemeanor at common law.

The exposing, by carrying a child infected with small-pox along a public way, near to a dwelling-house, etc., to the great danger of infecting persons there passing, is a great misdemeanor at common law. *Rex* v. *Vantandillis*, 4 Maule & Selwyn, 73.

The first act on the subject of the public health, generally, relating to England, which calls for attention is the 23 and 24 Vict., chap. 77, amending some existing acts for the removal of nuisances and the prevention of diseases, and constituting certain bodies, therein named, the local authorities to execute the Nuisance Removal Act, and repealing all former enactments constituting a local authority for the execution of the Diseases Prevention Act (except those contained in the Metropolitan Local Management Act) and directing that the board of guardians or the overseers of the poor, as the case may be, where there is no board of guardians, shall be the local authority for executing the Diseases Prevention Act, who are thereby required to provide carriages for the conveyance of infected persons suffering from contagious or infectious diseases; and two justices at petty sessions, upon proper complaint, may order the removal of a nuisance on any private premises, and the guardians of any union, or parish not within an union, may at any time employ one of their medical officers to make inquiry and report upon the sanitary state of the union or parish.

Various statutes from the time of James I had been passed dealing with the subject of the public health, but so limited in their definitions and scope that with the exception of the Metropolitan

Local Management Act, and the 23 and 24 Vict., chap. 77, together with the 29 and 30 Vict., chap. 90 (styled the Sanitary Act of 1866), no attempt was made at comprehensive legislation on this subject until the year 1875, when an act was passed (38 and 39 Vict., chap. 55), entitled "An act for consolidating and amending the acts relating to Public Health in England." By this act, nearly all former enactments were repealed, especially the whole of the 23 and 24 Vict., chap. 77, except so far as relates to the metropolis.

The act now in force (38 and 39 Vict., chap. 55), known as the Public Health Act, defines sanitary powers and duties, constitutes sanitary districts and authorities, confers special powers upon urban sanitary authorities, dissolves all former constituted districts, forms new districts with powers of local government, and creates local and special rural authorities for the purpose of carrying out its provisions.

It deals with such subjects as sewers and drains, use of sewers by manufacturers, disposal of sewage, sewage works without the district, enforcement of privy accommodation, public necessaries in urban districts, cleansing streets and houses, cleansing ditches and removal of manure, definition of nuisances, procedure for abatement of nuisances, jurisdiction as to nuisances on ships, proceedings in case of joint nuisance, leaving other remedies unaffected, offensive trades in urban districts, seizure of unsound food exposed for sale. It also regulates powers for supply of water, and deals with the pollution of streams or wells. It further bestows very summary powers for interfering with the occupation of cellar dwellings, and the regulation and inspection of not only common lodging-houses, but also of houses (not common lodging-houses) let in lodgings, with a view to the prevention of overcrowding, etc.

Provisions are also contained against infection generally, as well as in lodging-houses and canal boats. Preventive measures are directed against epidemic diseases; hospitals and medicine are provided, infected persons are to be removed to hospital, and mortuaries as well as places for *post-mortem* examinations are provided. Returns are also directed to be made to authorities as to deaths.

Sanitary districts and authorities are constituted, local boards and improvement commissioners are incorporated, the election of members of such local boards regulated, also of certain improvement commissioners, the powers and duties of urban authorities defined, also of rural authorities.

A combination of districts may be effected for the prevention of epidemics, for the execution of works, and for the appointing of medical officer of health.

The appointment of inspectors of nuisances and the auditing the accounts of officers generally is minutely provided for. Of course the authorities are clothed with all powers for making rates, and borrowing on and mortgaging the same, but the working machinery by which the financial result is arrived at need not form the subject of this paper.

Special powers are conferred upon the urban sanitary authorities to inclose, under certain circumstances, suburban commons, to establish elementary schools, for the adoption and management of highways, bridges and turnpike roads, paving and lighting streets, providing places of public recreation, regulating markets and slaughter-houses, and for making regulations as to street obstructions, fires, etc., and public bathing places.

The powers of medical officers of health and other officers are defined and an appeal given from the sanitary authority; the powers of inspectors are also defined.

The rural authority may be invested with powers of urban authority, and a port sanitary authority constituted and existing at time of passing of this act may be constituted with similar powers to those of local authorities; rural authority may make by-laws as to lodging of hop-pickers and certain local interests specified. Such appear to be the main provision of the Public Health Act for England, not including the metropolis.

Of the PUBLIC HEALTH (METROPOLIS) ACT (35 and 36 Vict., chap. 79) the provisions are as follows, based upon many previous acts, commencing with 18 and 19 Vict., chap. 116 (1854-5).

UNDER THE HEAD OF SANITARY POWERS AND DUTIES.

Definition of nuisances. Notice of nuisances, power of entry and inspection. Procedure for abatement of nuisances. Cleansing and improving ditches. Periodical removal of manure. Jurisdiction as to nuisance on ships. Nuisance caused by offensive trades. Seizure of unsound food exposed for sale. Also further provisions as to drainage, smoke, offensive trades, etc., as contained in Metropolis (Management Water) Acts.

Occupation of cellar dwellings. Common lodging-houses, registration, regulation and inspection of, in Metropolitan Police District. Houses, not common lodging-houses, let in lodgings.

Provisions against infection in canal boats and otherwise. Prevention of epidemic diseases. Providing hospitals and medicine. Removal of infected persons to hospital. Providing mortuaries and places for *post-mortem* examinations.

Local Authorities. — Vestries and district boards are constituted to execute Nuisances Removal and Diseases Prevention Acts. In city of London, commissioners of sewers to execute Nuisances Removal Acts. Power is given to appoint committees, and penalty enacted for damaging property of authorities.

Port sanitary authority for port of London — Sundry powers are given to local government board as to recovery of expenses out of rates, and borrowing money on security of rates.

Much the same description of sanitary legislation has been enacted for SCOTLAND, principally by acts 30 and 31 Vict., chap. 101; 34 and 35 Vict., chap. 38; 38 and 39 Vict., chap. 74, and 39 and 40 Vict., chap. 31 and chap. 75.

With respect to IRELAND, such legislation appears to have commenced in 1851 with an act for regulating common lodging-houses (14 and 15 Vict., chap. 28), and to have been constantly superadded to almost every subsequent session of Parliament, including the year 1876, when the Rivers Pollution Act (39 and 40 Vict., chap. 75) was passed. The powers conferred by some twenty different statutes are in most respects analogous to those conferred by the English Public Health Acts.

The Contagious Diseases Acts, relating to the medical examination, detention, harboring of, and hospitals for prostitutes, at certain military and naval stations, form an important ingredient in the public health system, especially as far as relates to the army and navy, and the localities where they are constantly stationed. Those acts are the 29 and 30 Vict., chap. 35, the 31 and 32 Vict., chap. 80, and the 32 and 33 Vict., chap. 96.

The vaccination statutes for England, Ireland and Scotland respectively are very voluminous; vaccination is made compulsory and inoculation forbidden. In the case of an illegitimate child the duty of the mother as to the vaccination of such child is defined. The act under which all former acts were consolidated, amended or partially repealed is the 30 and 31 Vict., chap. 84, and numerous intervening acts between it and 42 and 43 Vict., chap. 70, have supplemented the original provisions.

The adulteration of food and drugs is provided against by statutes extending over a period of nearly fifty years, from 6 and 7 Wm. IV, chap. 37, to 42 and 43 Vict., chap. 30, and relate to Great Britain. There has been special legislation as to Ireland from 1 and 2 Vict., chap. 28, to 41 and 42 Vict., chap. 52, and the efforts to regulate the trade in intoxicating liquors throughout the United Kingdom embraces the period from 1660 to 1876, under the statute law revision (39 and 40 Vict., chap. 20).

Additional legislation, almost from year to year up to the present time has supplemented the statute law hitherto referred to, relating to the public health. The 46 and 47 Vict., chap. 35 — the Diseases Prevention (Metropolis) Act, 1883 — gives power to the managers of any hospital, asylum or work-house to contract for reception of cholera patients subject in the case of an asylum to the consent of the local government board, and in case of a work-house subject to provisions of Metropolitan Poor Act of 1867. And vestries and district boards may borrow money for such purposes. Wharves and landing places for embarkation of patients are required to be provided and expenses authorized. Local government board shall be deemed to have assigned to port of London the powers had assigned to them.

46 and 47 Vict., chap. 37 — The Public Health Act (support of sewers), Amendment Act, 1883 — relates to construction or maintenance of any works, under the title of "Sanitary Works," of sewerage, drainage, sewage disposal, lighting or water supply, etc.; also, with respect to mines, whether the land under which such

sanitary work is situated is or is not vested in the local authority, or is or is not wholly or partially dedicated to the public, and no compensation can be demanded for any right of support required, lateral or virtual, nor on the other hand is any liability incurred by any person working mines in a reasonable manner for any damage to a sanitary work.

46 and 47 Vict., chap. 59 — Epidemic and other Diseases Prevention Act, 1883 — enables sanitary authorities in England and Ireland to borrow money for the purposes therein enumerated.

46 and 47 Vict., chap. 48, empowers the establishment of temporary cholera hospitals in Ireland.

RECENT LEGISLATION ON THE SUBJECT NOT PREVIOUSLY REFERRED TO.

Powers for supply of water. 41 and 42 Vict., chap. 25, §§ 8, 10.

Power to invest urban authority with powers of rural authority. 41 and 42 Vict., chap. 25, § 11.

Houses in rural districts not to be built or rebuilt without supply of water. 41 and 42 Vict., chap. 25, § 6.

Transfer of buildings by guardians to rural authorities for use as an infectious hospital. 42 and 43 Vict., chap. 54, § 14.

Providing cemeteries. 42 and 43 Vict., chap. 31.

Cemetery without district. 42 and 43 Vict., chap. 31, § 2 (2.)

England.— General Law. 41 and 42 Vict., chap. 16, § 101.

Factories and workshops to be kept in cleanly state, ventilated and not overcrowded. § 3.

Notice by inspector to sanitary authority of neglect of sanitary provisions, and action of sanitary authority thereupon. § 4.

Factories, workshops and workplaces not subject to Factory Acts, if not kept in cleanly state, or not ventilated, or if overcrowded, to be deemed nuisances.

In the Metropolis. (E.) 41 and 42 Vict., chap. 16, § 101.

Elsewhere in England. 41 and 42 Vict., chap. 16, § 101.

In Scotland. 41 and 42 Vict., chap. 52, § 107.

In Ireland. 41 and 42 Vict., chap. 16, § 106 (11.)

Fencing of certain machinery in factories. 41 and 42 Vict., chap. 16, § 5.

Power to give notice requiring fencing of other machinery, or of dangerous vats and structures in factories or workshops, or fixing of insecure or replacing of faulty grindstones and procedure thereon. 41 and 42 Vict., chap. 16, §§ 6–8.

Restrictions on children, young persons and women cleaning machinery in motion, or working between parts of self-acting machinery. 41 and 42 Vict., chap. 16, § 9.

Period of employment, and regulations as to meal-time in cases of children, young persons and women employed in textile factories, non-textile factories and workshops. 41 and 42 Vict., chap. 16, §§ 11, 15, 17, 18.

Children and young persons belonging to same family employed in domestic factory or *workshop. 41 and 42* Vict., chap. 16, § 16.

Fixing and notice of period of employment, meal-times, and mode of employment of children. 41 and 42 Vict., chap. 16, § 19.

Prohibition of employment of children under ten. 41 and 42 Vict., chap. 16, § 20.

Prohibition of employment of children, young persons and women on Sunday. 41 and 42 Vict., chap. 16, § 21.

Holidays and half holidays in factories and workshops. 41 and 42 Vict., chap. 16, § 22.

Children or young persons under sixteen not to be employed in factories without certificate of fitness; regulations as to certificates. 41 and 42 Vict., chap. 16, § 27.

Power to occupiers of workshops to obtain certificates of fitness, etc. 41 and 42 Vict., chap. 16, § 28.

Power of inspector to require discontinuance of employment of child or young person, as incapacitated, production of surgical certificate of capacity. 41 and 42 Vict., chap. 16, § 29.

Further provisions as to certificates of fitness; power of inspectors to annul certificates in certain cases. 41 and 42 Vict., chap. 16, § 30.

Notice to inspector and certifying surgeon of accidents causing death or bodily injury; investigation and report by surgeon. 41 and 42 Vict., chap. 16, §§ 31, 32.

SPECIAL PROVISIONS.

Limewashing and washing of factories and workshops. 41 and 42 Vict., chap. 16, § 33.

Painting, washing and limewashing of bake-houses. 41 and 42 Vict., chap. 16, § 34.

Restrictions on use of rooms in bake-houses for sleeping places. 41 and 42 Vict., chap. 16, § 35.

Ventilation by fan in certain factories and workshops. 41 and 42 Vict., chap. 16, § 36.

Protection of children, etc., employed in web spinning. 41 and 42 Vict., chap. 16, § 37.

Prohibition of employment of children or young persons in certain factories and workshops. 41 and 42 Vict., chap. 16, § 38, sch. I.

Prohibition of taking meals or remaining during meal-time in certain factories, etc.; power to extend prohibition to other factories, etc., by order of Secretary of State. 41 and 42 Vict., chap. 16, § 39, sch. II.

Period of employment and times for meals in printworks and bleaching and dyeing works. 41 and 42 Vict., chap. 16, § 40.

Power to extend to classes of workshops, prohibition of employment of children and young persons under sixteen, in factories without certificate of fitness. 41 and 42 Vict., chap. 16, § 41.

Public Health Act, 1875 (38 and 39 Vict., chap. 55), repeals

The whole of 11 and 12 Vict., chap. 63. P. H. A., 1848, common lodging-house, Ireland.

The whole of 14 and 15 Vict., chap. 28. C. L. H. Act, 1851, except as far as relates to M. P. D.

The whole of 16 and 17 Vict., chap. 41. C. L. H. Act, 1853, except as above.

The whole of 18 and 19 Vict., chap. 116. Diseases Prevention Act, 1855, except so far as relates to the Metropolis.

The whole of 18 and 19 Vict., chap. 121. Nuisance Removal Act for England, 1885, except as above.

The whole of 21 and 22 Vict., chap. 98. Local Government Act, 1858.

The whole of 23 and 24 Vict., chap. 77. Act to amend Acts for Removal of Nuisances and Prevention of Diseases, except as above.

The whole of 24 and 25 Vict., chap. 61. Local Government Act, 1858; Amendment Act, 1861.

The whole of 26 and 27 Vict., chap. 17. Local Government Act; Amendment Act, 1863.

The whole of 26 and 27 Vict., chap. 117. Nuisances Removal Act for England; Amendment Act, 1863, except as above.

The whole of 28 and 29 Vict., chap. 75. Sewage Utilization Act, 1865, except as far as relates to Scotland and Ireland.

The whole of 29 and 30 Vict., chap. 41. Nuisances Removal Act (No. 1), 1866, the whole act except as relates to Metropolis.

29 and 30 Vict., chap. 90. The Sanitary Act, 1866; parts I, II, and III, except so far as relates to Metropolis, or to Scotland or Ireland.

The whole of 30 and 31 Vict., chap. 113. Sewage Utilization Act, 1867, except so far as relates to Scotland or Ireland.

The whole of 31 and 32 Vict., chap. 115. Sanitary Act, 1868, except as far as relates to Metropolis.

The whole of 32 and 33 Vict., chap. 100. Sanitary Loans Act, 1869, except as above.

The whole of 33 and 34 Vict., chap. 53. Sanitary Act, 1870, except as above.

The whole of 35 and 36 Vict., chap. 79. Public Health Act, 1872, except as above.

The whole of 37 and 38 Vict., chap. 89. Sanitary Law Amendment Act, 1874, except so far as relates to the Metropolis or the Metropolitan Police District.

Of the above acts, the following, namely: 'The Public Health Act, 1848,' and 'The Local Government Act, 1858,' and 'The Local Government Act, (1858) Amendment Act, 1861,' and 'The Local Government Act, Amendment Act, 1863,' are in this act (38 and 39 Vict., chap. 55), referred to as 'The Local Government Acts.'

At an election for a member of a local board, V. and M. were the only candidates; M. was declared to be elected, he having obtained 94 votes, and V. 89. V., without the consent of the Attorney-General, preferred an information under the P. H. Act (1875), Schedule II. R. 69, against W., charging him with fabricating in part the voting paper of D., a person entitled *to three votes at* the election; but

the justices dismissed it on the ground that V. was not a "party aggrieved" within the P. H. Act, 1875, § 253, and therefore that the consent of the Attorney-General was necessary. *Held*, that the dismissal of the information was wrong within the meaning of that statute. *Verdin* v. *Wray*, 2 L. R. Q. B. Div. 608; 25 W. R. 274; 46 L. J. Q B. Div. 170; 35 L. T. (N. S.) 942.

Generally.—Where a local board of works attempted to exercise their arbitrary powers without leaving to a person affected thereby the right of appeal given by the act, the Court of Chancery restrained them by injunction from so doing, until the question should be determined by the proper tribunal. *Tinkler* v. *Wandsworth District Board of Works*, 1 Giff. 412; affirmed on appeal, 2 DeG. & J. 261.

Where there is a doubt whether the arbitrary powers given to local boards are properly exercised it is the duty of the court to take care that the checks appointed by the Legislature have the operation in favor of the persons affected. *Ib.* Where a board constituted by an act of Parliament is authorized by it to delegate any of its powers to a committee, the powers so conferred upon the committee must be exercised by them acting in concert; and it is not competent to the committee to apportion among themselves the duties so delegated to them; and one of them acting alone, pursuant to such appointment, cannot justify his acts under the act of Parliament. *Cook* v. *Ward*, 2 L. R. C. P. Div. 255; 25 W. R. 593; 37 L. T. (N. S.) 893; C. A. affirming judgment of the C. P. Div.; 25 W. R. 350; 46 L. J. C. P. Div. 554.

A board having statutory power to consent in writing to a particular act is not bound by tacit acquiescence. *Ib.*

A provisional order of a Secretary of State empowering a local board of health to put in force the power of the Land Clauses Act of 1845 (8 and 9 Vict., chap. 18) with respect to the purchase of lands otherwise than by agreement, is nothing more than a substitution for proceedings before a standing orders committee, and has no force or validity until confirmed by act of Parliament, and cannot be brought up by *certiorari* for the purpose of being quashed. *Frewer* v. *Hastings Local Board of Health*, 11 Jur. (N. S.) 670; 34 L. J. Q. B. 159; 13 W. R. 678; 12 L. T. (N. S.) 346.

A corporation being, as the sanitary authority of a city, duly empowered to take lands specified in the schedule to its provisional order, for the purpose of public improvements, served notice to treat upon the trustees of a charity, who were the owners of the lands. The lands comprised in the notice were more than were actually required for the purpose of the work. *Held*, that the cases deciding that a railway company cannot take compulsorily more land than is actually required for its works did not apply to a corporation taking lands for public improvements, and that the corporation was entitled to take compulsorily the whole of the land comprised in the notice. *Quinton* v. *Bristol* (*Mayor*, *etc.*), 43 L. J. Ch. 783; 22 W. R. 434; 17 L. R. Eq. 523, V. C. M.

Where a local act required the consent of commissioners to new streets becoming highways to make the inhabitants liable to repair them, an order of the local board on owners to repair a street in respect of which such consent had not been given, is lawful inasmuch as such street was not a highway repairable by the inhabitants at large. *Willis* v. *Wallingtom*, 13 C. B. (N. S.) 865; 32 L. J. C. P. 86, Exch. Cham.

Under 11 and 12 Vict., chap. 63, § 55 (repealed by 21 and 22 Vict., chap. 98, §§ 32, 33) local boards of health have no general power to make by-laws for carrying out the purposes of the act, but only such by-laws as are authorized by section 55. *Reg.* v. *Wood*, 5 El. & Bl. 49; 3 C. L. R. 1134; S. C., *nom. Reg.* v. *Rose*, 1 Jur. (N. S.) 802; 24 L. J. M. C. 130.

A by-law, "that all occupiers of any premises within the district shall properly clean and remove all snow, or other obstructions, from the foot-path and channel opposite their respective premises, before nine of the clock in the forenoon of each day," was bad. *Ib.*

An information having been laid against an occupier under this by-law, and it being proved that the occupier had neglected to remove snow, it was objected that the by-law was bad; but the justice held that, inasmuch as it had been allowed by the Secretary of State, he could not entertain the objection; and he convicted the occupier. The court quashed the conviction on *certiorari*, though section 137 enacts, that no proceeding touching the conviction of any offender against the act shall be removable by *certiorari*, holding that the justice acted without jurisdiction. *Ib.*

A local board of health gave notice under 11 and 12 Vict., chap. 63, § 69, to the owner of a house abutting on a street, to level and pave it, and, in default of the owner, they did the work themselves. By the alteration so caused in the level of the street, the access to the house was rendered difficult and dangerous. *Held*, that the owner was entitled to compensation under section 144. *Reg.* v. *Wallasey Local Board of Health*, 4 L. R. Q. B. 351; 10 B. & S. 428; 38 L. J. Q. B. 217; 17 W. R. 766; 21 L. T. (N. S.) 90.

The Manchester Improvement Act (1851) enacts in section 17, that the expenses incurred by the town council in sewering and flagging a street shall be borne by the owners, "according to the extent of their respective houses and grounds lying alongside or adjoining to the said street." *Held*, that the owner of the ground at the end of a street forming a *cul de sac* was liable under this section, although a wall divided his property entirely from the street. *Manchester* (*Mayor, etc.*) v. *Chapman*, 18 L. T. (N. S.) 640; 16 W. R. 974; 37 L. J. M. C. 173, C. P.

By 11 and 12 Vict., chap. 63, § 69, and 15 and 16 Vict., chap. 42, § 13, a local board may require the owners of the houses in a street, not being a highway repairable by the inhabitants at large, to sewer, level and pave it, and in default of the owners the board may do the work, and the expenses are to be paid by the owners in proportion to their frontage, the proportion to be settled by the

surveyor, and in case of dispute, by arbitration; and by 21 and 22 Vict., chap. 98, § 63 (repealed by 38 and 39 Vict., chap. 55), the apportionment of the surveyor shall be binding and conclusive upon every owner, unless within three months from the notice of the amount of the proportion, he shall, by written notice, dispute the same. A local board having duly proceeded under the act, and sewered, leveled and paved a street, and no notice having been given by an owner that he disputed the apportionment, the board sought to enforce before justices the payment of the proportion charged. *Held*, that it was still open to the owner to dispute his liability, and to show that the street was a highway repairable by the inhabitants at large. *Hesketh* v. *Atherton Local Board*, 9 L. R. Q. B. 4; 43 L. J. M. C. 37. The owner upon whom notice to level, etc., under 11 and 12 Vict., chap. 63, § 69, and 26 and 27 Vict., chap. 70, § 3, has been served, and who has not given notice of objection, is estopped from showing that the street in question is a highway repairable by the inhabitants at large. *Reg.* v. *Linesey*, 2 L. T. (N. S.) 470, Q. B.

The word "street" in the Towns Police Clauses Act, 1847, and the Public Health Act, 1848 (the latter repealed), means a place to which the public have a right of access, and does not include a spot from which the public may be shut out by the owner of the soil. *Curtis* v. *Embery*, 7 L. R. Exch. 369; 21 W. R. 143, Exch.

A piece of ground dedicated by user to the public as a road is not a "street, not being a highway" within the Public Health Act, 1848, § 69 (since repealed). *Healey* v. *Batley* (*Corporation*), 44 L. J. Ch. 642, V. C. B.

A corporation, affecting to act under the provisions of their local act, commenced to break up and excavate a private road belonging to the plaintiff, and situate within the borough, for the purpose of laying down a sewer. *Held*, that on the construction of the local act, taken with the provisions contained in the Public Health Act, 1848, the Sewage Utilization Act, 1865, 28 and 29 Vict., chap. 75, and the Public Health Act, 1875 (by which latter act the first is wholly repealed, and the second except so far as relates to Scotland and Ireland), the road was a street within those acts, and that the corporation had power to lay down the sewer thereunder and for that purpose to break up the soil thereof. *Taylor* v. *Oldham Corporation*, 25 W. R. 178; L. R. Ch. Div. 395; 25 L. T. (N. S.) 696; 46 L. J. Ch. Div. 105, R.

When premises have been provided for the purpose of being used as public walks or pleasure grounds, under the Public Health Act, 1848, 11 and 12 Vict., chap. 63, § 74, it is allowable to erect thereon such buildings as may be conducive to the purpose for which the premises have been required. Of such a nature are a conservatory, a museum and a public library, but not a town hall or a school of art. *Attorney-General* v. *Sunderland* (*Corporation*), 45 L. J. Ch. 839; 24 W. R. 991; 2 L. R. Ch. Div. 634, C. A. Although the above act is repealed, the principle remains the same wherever such a power as above is given.

By section 326 (Part XI, saving clauses and repeal of acts) of 38 and 39 Vict., chap. 55, Public Health Act, 1875, "All urban sanitary authorities and rural sanitary authorities existing at the time of the passing of this act shall be deemed to be urban authorities and rural authorities under this act; and all joint boards, port sanitary authorities, and parochial committees, and all local government districts constituted in pursuance of the Sanitary Acts, and existing at the time of the passing of this act, shall be deemed to be joint boards, port sanitary authorities, committees of rural sanitary authorities, and parochial committees, and local government districts, under this act; and the members of all the above-mentioned bodies shall hold office (subject to the provisions of this act respecting the election of members of local boards) for such time as they would respectively have held office if this act had not been passed; and the officers and servants of all the above-mentioned bodies shall continue to hold their several offices and employments on the same terms and subject to the same conditions as to duties, remuneration and otherwise, as they would have held them if this act had not been passed; and all by-laws duly made under *any of the Sanitary Acts* by this act repealed and not inconsistent with any of the provisions of this act, shall apply to all such bodies existing at the time of the passing of this act, and to their several officers and servants, in substitution for the provisions of the Sanitary Acts by this act repealed, but so as not to affect any right acquired or liability incurred under the Sanitary Acts, or any of them, before the passing of this act, and existing at the time of the passing of this act." Except where cases have been decided since the passing of the act of 1875, unless they involve general principles necessarily recognizable independent of statutory enactment, it has been thought better not to complicate the subject with decisions which might be affected by the subsequent legislation, which of itself has yet to be further tested, as some misapprehension might thus arise inadvertently. The difficult question of effectually legislating for the public health has been of too serious and intricate a character to justify the reproduction of decisions on repealed statutes except where they have been ratified by subsequent decisions in consonance with the more recent enactments.

ROADS AND OTHER HIGHWAYS.

By 15 and 16 Vict., chap. 42, § 13, the term "highway" in sections 68 and 69 of 11 and 12 Vict., chap. 63, shall mean any highway repairable by the inhabitants at large. See *Kingston-upon-Hull Local Board of Health* v. *Janes*, 2 Jur. (N. S.) 1193.

SEWERS.

A local board of health has no power to enter upon land without the consent of the owner, for the purpose of making reservoirs and deposit beds for retaining the sewage. *Sutton* v. *Norwich* (*Mayor, etc.*), 27 *L. J. Chanc.* 739, *V. C. K.*

A local board of health is not justified in polluting the surface water which flows by an open gutter into a canal, by diverting it into a sewer, and passing the sewage into it. *Manchester, Sheffield & Lincolnshire Railway Company* v. *Worksop Board of Health*, 23 Beav. 198; 3 Jur. (N. S.) 304; 26 L. J. Chanc. 345.

Where a canal company had a statutory power to supply the canal with water, out of such "brooks, streams and water-courses as should be found within a certain distance," *held*, that it would be difficult to hold that the mere surface water of a road, not arising from any spring, or natural certain supply, could fall within the act, so far and to such an extent as to exclude a local board of health from making a system of drainage essential to the district, which offending against the right of no one in any other particular, merely allowed to flow, through gratings into the sewer, the water collected on a public road, from rain and from the overflowing of the surplus of the neighboring houses, which water had theretofore flowed down an open gutter into a canal. *Ib.*

By direction of a local board of health the sewage of a town had been by means of drainage conveyed to a river, which sewage, not having been completely deodorized before coming in contact with the river, had so polluted the stream passing B.'s property, as to kill the fish therein, and otherwise cause a nuisance. *Held*, that B. was entitled to an injunction to restrain the further pollution of the water passing by his property. *Bidder* v. *Craydon Local Board of Health*, 6 L. T. (N. S.) 778, V. C. W.

A by-law made by a local board, which provides that if any owner or person should construct, or cause to be constructed any works, or do any act [or omit to do any act, or comply with any], requirement of the local board, or should make any alterations in any works after they have been completed, whether in new or existing buildings, contrary to the provisions therein contained, the local board might cause such works to be removed, altered or pulled down, is invalid, as exceeding the powers conferred by 21 and 22 Vict., chap. 98, § 34 (now repealed). *Brown* v. *Holyhead Local Board of Health*, 1 H. & C. 601; 32 L. J. Exch. 25.

A by-law by a local board of health, imposing continuing penalties on any person who shall construct any works, or do, or omit to do any act, or to comply with any requirements of the board, or shall make any alteration or deviation in any plan approved by the board, whether in new or existing buildings, contrary to the provisions therein contained, or shall do any act, matter, or thing contrary to the by-laws made under the authority of the 21 and 22 Vict., chap. 98, § 34 (since repealed), or shall omit, neglect, or fail to perform any of the works, matters, or things required by such by-laws, and empowering the board to remove, alter, pull down, or otherwise deal with such work as the case may require, is invalid, as exceeding the authority given by the 21 and 22 Vict., chap. 98. *Young* v. *Edwards*, 33 L. J. M. C. 227; 11 L. T. (N. S.) 424, Exch.

But see *Hall* v. *Nixon*, 10 L. R. Q. B. 152; 44 L. J. M. C. 51, 55; 32 L. T. (N. S.) 87; 23 W. R. 612.

If a person gives notice of his intention to build, and leaves with the local board plans and sections, he may at once commence the building subject to the right of its being altered or pulled down, if not in conformity with the by-laws of the board. *Ib.*; and *Hattersley* v. *Barr*, 12 Jur. (N. S.) 894; 14 W. R. 864; 14 L. T. (N. S.) 565; 4 H. & C. 523.

A by-law made by a local board of health, that no dwelling-house should be erected without having at the rear, or side, a sufficient roadway for the purpose of affording efficient means of access to the privy or ash-pit belonging to the house, is bad, as beyond the jurisdiction conferred by the act. *Waite* v. *Garston Board of Health*, 17 L. T. (N. S.) 201; 16 W. R. 78; 3 L. R. Q. B. 5; 37 L. J. M. C. 19.

Section 99 of the Kingston-upon-Hull Improvement Act of 1854, enacts that every house to be thereafter constructed on vacant ground (except corner houses, etc.) shall have a back yard, or other vacant ground and area, of not less than eight feet, extending from the main building for the whole length of such building; and by section 101, a plan shall be furnished to the local board of health by persons intending to build, showing the particulars required by that act; and the building shall not be commenced until the local board approve the plan. A builder submitted to the local board of health of the borough of Kingston-upon-Hull a plan of four new houses (not corner houses) having vacant ground at the side, but not at the back. The local board disapproved the plan, as not complying with section 99, but the party commenced to build notwithstanding. *Held*, that whether section 99 required the vacant space to be at the back or not, the party was rightly convicted of an offense against section 101. *Pearson* v. *Kingston-upon-Hull Local Board of Health*, 3 H. & C. 921; 35 L. J. M. C. 36; 13 L. T. (N. S.) 180.

Section 97 enacts, that any building after the commencement of the act built, shall not, without the previous consent of the local board, be used as a dwelling-house, except only during such time as there is adjoining or belonging thereto, or occupied therewith, either a street or clear open space in and to the full extent of the front thereof, and of not less than twenty-feet in width. *Held*, that a party had committed an offense under this section in building and causing to be used, without the consent of the local board, a dwelling-house with an open space in front less than twenty feet in width. *Ib.*

Section 103 enacts that if any sewer, drain, privy, cesspool, ash-pit, building or other work be made or suffered to continue, contrary to any of the provisions of this act, * * * every person so offending shall for every such offense forfeit a sum not exceeding £5, and for every day after the first during which the offense continues, a sum not exceeding 10*s*. *Held* (by reference to the sections preceding), that the word "building" is not restricted to a building, of similar description with the class of buildings previously enu-

merated in the section, but includes a dwelling-house; and that the commencing a building, within section 101, is the making a building, within section 103. *Ib.*

Held, also, that the user of a dwelling-house contrary to section 97 is not the making or suffering it to continue contrary to the act, within section 103. *Ib.*

A medical officer of health reported under the Artisans and Laborers' Dwellings Act, 1868, 31 and 32 Vict. chap., 130, §§ 5 and 6, that the premises in Marsh's Court, in the parish of St. George the Martyr, Nos. 1 to 12 and 13, were in a condition or state injurious to health, so as to be unfit for human habitation; and upon this report the surveyor reported that he had surveyed the premises, and was of opinion that the causes of the evil were structural defects in the premises, and that such defects could not be remedied by structural alterations or improvements, or otherwise, but such premises ought to be demolished. The whole of the premises belonged to one party. The vestry subsequently made an order that the premises should be wholly demolished. *Held*, that, first, it was not necessary that there should be a report and an order in respect of each house, but that one report and one order were, under the circumstances, sufficient. *Flight* v. *St. George the Martyr* (*Southwark Vestry*), 24 L. T. (N. S.) 24, Q. B. *Held* secondly, that as the report of the surveyor stated that the structural defects could not be remedied, but that the premises ought to be demolished, it was unnecessary to specify in detail in what the structural defects consisted. *Ib.*

MARKETS.

A corporation, being lords of a market and owners of the soil, is entitled at common law to remove the market; but where the corporation, acting as a local board, takes steps under the enactment of the Local Government Act, 1858, 21 and 22 Vict., chap. 98, § 34, to set up a market in a new place, it can only act under the powers and subject to the provisos of the statute, and is not entitled to fall back on its common-law right. *Ellis* v. *Bridgeworth* (*Corporation*), 2 Johns. & H. 67; 9 W. R. 331; 4 L. T. (N. S.) 112.

Quære, whether the immemorial privilege of householders of erecting and hiring out stalls in front of houses in market place is a right protected by the proviso in section 50.

Semble, that the setting up of a new market under this statute, at a short distance from and in lieu of an ancient market, is an establishment of a market, within section 50, and not a mere removal. *Ib.*

By 26 and 27 Vict., chap. 32, the owner of any coals brought within the district of the local board of health for Hull is bound, "before such coal, or any part thereof, is sold or delivered or dealt within the district," to deliver to the inspector appointed for the purpose, the original pit note denoting the quantity and quality thereof. A

ship-owner brought coals in a lighter into the district of the board of health for Hull, where they were transferred into a steamer, also belonging to the ship-owner. *Held*, that this was dealing with the coals within the meaning of the statute, and that the ship-owner was bound to deliver the pit note to the inspector. *Wilson* v. *Hull Local Board of Health*, 12 Jur. (N. S.) 706, Q. B. A Local Improvement Act imposed a penalty for exposing for sale in any of the streets of the town any meat so as to project over or upon any foot or carriageway.

The act provided that no person should be subject to any penalty for placing any stall, or exposing provisions for sale so as such stalls shall be placed in such part of the streets as should be appointed by the commissioners, and that no person should be subject to any penalty for placing any stall or exposing provisions for sale in such parts of the streets as should have been theretofore used for that purpose at the times of the usual fairs and markets within the town.

In 1853, a local board of health was constituted in the township, under 16 and 17 Vict., chap. 24, who, by by-laws duly allowed and published, appointed certain places for markets for certain descriptions of goods on market days, and imposed penalties for the breach thereof. *Held*, that the provisions of the local act did not exempt from such penalties one who violated these by-laws by exposing for sale meat at a place other than that so appointed by the local board of health, notwithstanding the spot where such meat was so exposed for sale was a place where such articles had for a long series of years been sold by him and others. *Savage* v. *Brook*, 15 C. B. (N. S.) 264; 10 Jur. (N. S.) 587; 33 L. J. M. C. 42; 12 W. R. 91; 9 L. T. (N. S.) 334.

A local board acting under the powers of the Local Government Act, 21 and 22 Vict., chap. 98, and the Markets and Fairs Clauses Act, 10 and 11 Vict., chap. 14, made by-laws, directing that cattle markets and an annual show of horses should be held in prescribed places, and appointing a toll for cattle, horses, etc., exposed for sale in such markets. An auctioneer, at the time when these markets were established, was possessed of a building called the Agricultural Hall, which was erected some years before the passing of the by-laws regulating the market. It was a large building, containing a ring or area in which was accommodation for about 100 head of cattle. Adjoining to and communicating with it was a yard with pens capable of holding 1,400 sheep. His dwelling-house was separated from the Agricultural Hall by his harness-room and stable. He advertised and held sales by auction in the Agricultural Hall on market days, the average sale on these days amounting to 100 cattle and 1,000 sheep, and exceeding the sales in the regular market. The cattle and sheep so sold were the property of farmers and others, the auctioneer charging them with a commission. *Held*, that, without expressing any opinion whether an auctioneer would have been at liberty to sell horses by auction on his premises, notwithstanding the market, it was evident, having regard to the nature

and extent of his premises, that they were not part of his dwelling place or shop within the meaning of the 10 and 11 Vict., chap. 14, § 13, and that the business carried on by him was not a right, power or privilege which he enjoyed when the market was established, within the meaning of the Local Government Act (§ 50). *Fearon* v. *Mitchell*, 41 L. J. M. C. 170; 7 L. R. Q. B. 690; 27 L. T. (N. S.) 33.

SLAUGHTER-HOUSES, OFFENSIVE TRADES AND NUISANCES.

A police act empowered a town council of a borough to grant licenses for the erection of slaughter-houses. A. applied for a license. The market committee inspected the site and recommended the grant. The committee passed a resolution to grant the license, and communicated the same to A., and the resolution was confirmed by the town council. *Held*, that though it was usual afterward to grant a formal license in a printed form, still the grant was complete on the confirmation of the resolution and communication thereof to A., and operated as a license. *Howarth* v. *Manchester* (*Mayor, etc.*), 6 L. T. (N. S) 683, Q. B.

By 11 and 12 Vict., chap. 63, § 64 (the whole act since repealed) the business of a slaughterer of cattle, or other noxious or offensive business, shall not be newly established in any building or place in any district, after the act has been applied to it, without the consent of the local board of health; and whosoever offends against this enactment shall be liable, for each offense, to a penalty of £50. A cattle market company, cattle having never been slaughtered in the market before, after the act had been applied to the district, erected a building, in which they allowed persons to slaughter cattle on the payment of 2*s.* a head, the company finding the tackle attached to the building, but the persons slaughtering bringing their own implements. *Held*, that the company was liable to the penalty. *Liverpool New Cattle Market Company* v. *Hodson*, 2 L. R. Q. B. 131; 8 B. & S. 184; 36 L. J. M. C. 30; 15 W. R. 563; 15 L. T. (N. S.) 534.

The Towns Improvement Clauses Act, 10 and 11 Vict., chap. 34, § 126, prohibits the use of a slaughter-house without the license of the commissioners; that is, in certain boroughs the corporation, acting as the local board, under 21 and 22 Vict., chap. 98. The corporation was the local board in Brecon. The Brecon Markets Act, 1862, which incorporated the Brecon Markets Company, empowered the company, with the consent of the corporation, to erect slaughter-houses. *Held*, that the consent of the corporation under the latter act operated as the license of the local board under the former act. *Anthony* v. *Brecon Markets Company*, 21 W. R. 27; 26 L. T. (N. S.) 979; 7 L. R. Exch. 399, Exch. Cham.; reversing 2 L. R. Exch. 168; 36 L. J. Exch. 113; 15 L. T. (N. S.) 665; 15 W. R. 620.

Prior to the coming into operation in a town of the 31 and 32 Vict., chap. 98, S. occupied premises in a street there for the pur-

pose of slaughtering pigs. These premises consisted of a yard with an entrance by closed doors or gates from the street, and in the yard, pig-pens, a cart-shed, a shed used for slaughtering pigs, and a stable for horses, the external vaults of which constituted the walls of the building. While the premises were so used S., upon the coming into operation of the act, obtained a license, which license stated that the animals to be slaughtered were pigs. No animals before them were ever slaughtered in the stable. After obtaining such license S. had converted the stable into another slaughtering shed, and used the same for slaughtering bullocks and sheep therein. Upon an information for using this stable as a slaughter-house without having obtained a license for that purpose, the justices held that upon a proper application of the law to the facts, S. was entitled to use the stable as he did, for that the stable, as forming an original portion of the premises licensed as a slaughter-house, was covered by such license. *Held*, that the justices were right. *Brighton Local Board of Health* v. *Stenning*, 15 L. T. (N. S.) 567, Q. B.

Brickmaking is not necessarily a noxious or offensive business, trade or manufacture, within 11 and 12 Vict, chap. 63, § 64 (repealed). *Wanstead Board of Health* v. *Hill*, 13 C. B. (N. S.) 479; 9 Jur. (N. S.) 972; 32 L. J. M. C. 135; 11 W. R. 368; 7 L. T. (N. S.) 744.

PROCEEDINGS TO COMPEL OWNERS TO DO WORKS REQUIRED.

Land had been conveyed to three trustees, under 4 and 5 Vict., chap. 38, § 2, for the purposes of the act, and to permit the premises and all buildings erected thereon to be forever used as a school for the education of poor children, and for the residence of the master and mistress, and for no other purpose whatsoever. The school was built and used according to the trust, no rent whatever being received by the trustees. The local board gave the proper notices for paving the street, along which the school fronted, to one of the trustees and the owners of other premises fronting the street, under 11 and 12 Vict., chap. 63, § 69; and they charged the trustee, as owner of the school, the proportion according to the frontage of the school. *Held*, that the trustee was the owner within section 2, which enacts that "owner" "shall mean the person for the time being, receiving the rack-rent of the lands or premises, whether on his own account or as agent or trustee for any other person, or who would so receive the same if such lands or premises were let at a rack-rent;" and that he was, therefore, liable to pay the proportion of the expenses. *Bowditch* v. *Wakefield Board of Health*, 6 L. R. Q. B. 567; 40 L. J. M. C. 214; 25 L. T. (N. S.) 88.

A nuisance arose from a privy in the upper part of a house, of which, with the shop belonging thereto, H. was the lessee, at a rack-rent, for twenty-one years. H. occupied the shop only, and sublet the upper part, where the nuisance arose, to K., a weekly tenant, and to this part of the premises H. had no access. C., as agent to H.'s lessor, collected the rent. The parish authorities, for the pur-

pose of abating the nuisance, under the powers given them by 29 and 30 Vict., chap. 90, § 21, and 18 and 19 Vict., chap. 121, § 12, summoned C., as the owner of the premises within the interpretation clause (§ 2) of the latter statute, before the justices, who made an order upon him to abate the nuisance. *Held*, that C. was not the owner within the true construction of section 2, as K., the weekly tenant, was the occupier of the premises where the nuisance arose, and that, therefore, H. was not the occupier, but the person receiving rent from the occupier of the property within the meaning of the statutes. *Reg.* v. *Bath (Justices)*; *Cook* v. *Montague*, 20 W. R. 624, Q. B.

By an order of justices under the Public Health Act, 1875, §§ 94, 96, it was found that on land, the property of a certain person named, a nuisance existed, viz., a foul ditch, caused by refuse water and offensive liquid from an adjoining brewery, and that this nuisance was caused by the act or default of the defendant as owner and occupier of the brewery, and it was ordered that the defendant, within three months, should abate the nuisance, and for that purpose should execute such works and do all such things as might be necessary, so that the same should no longer be a nuisance or injurious to health. Upon a rule for *certiorari*, on the ground that the defendant was not the occupier of the premises on which the nuisance was proved to exist, and that he had no power or authority from the owner to enter on the premises for any purpose whatever, *held*, that the order must be quashed. *Reg.* v. *Trimble*, 36 L. T. (N. S.) 508, Q. B. Div.

The power of justices to grant or refuse an order enabling a local authority to enter lands under section 305 of the Public Health Act, 1875, is wholly discretionary, their decision being, therefore, final. *Diss. Urban Sanitary Authority* v. *Aldrich*, 36 L. T. (N. S.) 663; 2 L. R. Q. B. Div. 179; 46 L. J. M. C. 183. A. applied to the justices under section 305 of the Public Health Act, for an order authorizing them, as the local authority, to enter upon certain lands of the defendant for the purposes of the act. The application was dismissed, but the justices stated a case under the 20 and 21 Vict., chap. 43, § 2, for the opinion of the court. *Held*, that the justices had no power to state a case, as this was not the determination of a complaint within 20 and 21 Vict., chap. 43, § 2. *Ib.*

The Public Health Act, 1875, 38 and 39 Vict., chap. 55, gives an appeal to quarter sessions in respect of any order, conviction, judgment or determination of any court of summary jurisdiction, subject to the condition that the appellant shall, within fourteen days after the cause of appeal has arisen, give notice to the other party of his intention to appeal. An order was made upon the appellants, under section 48, which order was eighteen days afterward served upon them; and they, within eight days from the receipt of the service, gave notice of appeal. *Held*, that the notice of appeal was too late. The words "cause of appeal" in section 269, subs. 2, have the same meaning as "decision of the court" in section

269, subs. 1; and a notice of an appeal against an order made under section 48 must be given within fourteen days from the time when the court pronounces its decision. *Reg* v. *Barnett Rural Sanitary Authority*, 45 L. J. M. C. 105; 1 L. R. Q. B. Div. 558; 35 L. T. (N. S.) 362.

APPORTIONMENT ON AND RECOVERY FROM OWNERS OF EXPENSES OF WORKS.

A street being out of repair, a local board of health gave notice to the owners of the adjoining houses to repair it, and on this not being complied with, executed the works, and gave notice of the expenses and apportionment to each of the owners. The owners gave notice of disputing the apportionment, and at the end of the three months limited by 21 and 22 Vict., chap. 98, § 63 (since repealed), the board made a demand of the amount. The owners having refused to pay, and the expenses not having been declared to be private improvement expenses. — *Held*, that the board had, under 11 and 12 Vict., chap. 43, § 11, six months from the expiration of the three months during which the apportionment might have been disputed, to take proceedings before justices of the peace for the recovery of the amount. *Jacomb* v. *Dodgson*, 3 B. & S. 461; 9 Jur. (N. S.) 848; 32 L. J. M. C. 113; 11 W. R. 308; 7 L. T. (N. S.) 674.

The 11 and 12 Vict., chap. 63 (since repealed), only authorizes an arbitration in respect of the proportion to be borne by a defaulting owner, and not in respect of any question as to the expenses being reasonable or properly incurred by the board. *Bagley* v. *Wilkinson*, 16 C. B. (N. S.) 161; 10 Jur. (N. S.) 726; 33 L. J. M. C. 161; 10 L. T. (N. S.) 543.

In 1858 a local board of health served upon W., an owner of premises within the meaning of 11 and 12 Vict., chap. 63, § 69, a notice to execute certain specified works in paving, etc.

The works not having been executed by him, the local board completed them on the 30th of November, 1860, and on the 21st of January, 1861, apportioned the expense among W. and the other owners, giving notice on the same day to him that "unless the amount of this account is paid within fourteen days after delivery, interest at the rate of £5 per cent per annum will be charged thereon until fully liquidated. To proportion of sewering, leveling, paving, flagging, channeling, etc., namely fifty feet frontage, at 5*s.* 4*d.*, £13 6 s." The amount was not paid, and the local board on the 25th of August, 1870, resolved and declared that the amount should be "private improvement expenses," and subsequently that the amount should be paid by two installments. W. refused to pay, and an information was laid against him. *Held*, that the local board, having elected in 1861 to treat the amount as a debt due from W., could not treat it as a private improvement expense. *Wilson* v. *Bolton (Mayor, etc.)*, 41 L. J. M. C. 4; 7 L. R. Q. B. 105; 25 L. T. (N. S.) 597.

Held, also, that to recover the amount from W. proceedings must

have been taken within nine months from the service of the notice of the 21st of January, 1861, which must be considered as a demand. *Ib.*

The lessee of a house which was demised for twenty-one years at an annual rent covenanted with his lessor during the term "to bear, pay and discharge the sewers rate, tithes, rent-charge in lieu of tithes, and all other taxes, rates of assessments and outgoings whatsoever, which at any time or times during the demise should be taxed, rated, charged, assessed or imposed upon the demised premises, or any part thereof, or upon the landlord or tenant in respect thereof, or on the rent thereby reserved (except as aforesaid)." Under the Sanitary Act, 1866, § 10, the local board of the district was empowered to require the owner of the house to connect the house drains with a main sewer, belonging to the board, and on his default, to do the work, and recover the expenses from the owner in a summary way. The local board having during the demise required the connection to be made, *held*, that the lessee was bound by his covenant to pay the expense of making it. *Crosse* v. *Raw*, 43 L. J. Exch. 144.

When works are executed by a local authority for the improvement of a street, it is necessary, before summary proceedings can be taken for the recovery of the amount apportioned upon any owner, that a demand of payment of the sum so apportioned should be served upon him, and the six months within which the summary proceedings must be taken under 11 and 12 Vict., chap. 43, § 11, are to be reckoned from such notice of demand, and not from the notice of apportionment, which is not a sufficient demand. *Grese* v. *Hunt*, 2 L. R. Q. B. Div. 389; 46 L. J. Q. B. Div. 202; 25 W. R. 543; 36 L. T. (N. S.) 404.

In July, 1877, justices of the peace made orders against the plaintiff and others, one of whom was L., for payment to the local board of the expense of repairing a street. It was agreed that the order should not be enforced for three months, in order to abide the decision on a case to be presented by L. to the Queen's Bench upon a point of law. L. appealed to the Quarter Sessions, and the order against him having been quashed on the ground of a technical error, he did not take a case to the Queen's Bench. The plaintiff was not told of what had taken place, and, in November, her time for appealing having gone by, an order to levy the amount against her was obtained from the justices.

On motion by the plaintiff, and on her undertaking to assent to the statement of a case to the Queen's Bench on the point of law, and on her bringing the amount claimed into court, considering the plaintiff had been misled by the board, the court restrained them from levying unless, or until, she should have an opportunity of stating a case to the Queen's Bench. *Ashworth* v. *Hebden Bridge Local Board*, 37 L. T. (N. S.) 496; V. C. M.

By the Public Health Act, 1848, § 69 (since repealed), the local board might require the owners of premises fronting or abutting

upon any street to sewer and pave the same, and, upon default, might themselves execute the work; and the expenses incurred by them were to be paid by the owners in default, and might be recovered in a summary manner. By section 129, summary proceedings were to be taken before two justices. By the Local Government Act, 1858 (since repealed), Amendment Act, 1861, 24 and 25 Vict., chap. 61, § 24 (since repealed), proceedings for the recovery of demands below £20, which local boards were empowered to recover in a summary manner, might at the option of the local board be taken into the County Court. By 11 and 12 Vict., chap. 43, § 11, in all cases where no time is specially limited for making a complaint before justices, it must be made within six months from the time when the matter thereof arose. A local board under the Public Health Act, 1848, § 69 (since repealed), incurred expenses in sewering and paving a street, upon which premises belonging to R. abutted; his proportion of the expenses amounted to £13 5 6. On the 18th of February, 1873, notice was served by the board on him that the foregoing amount was apportioned upon him, and that the same would become payable by him unless within three months he disputed it. R. did not dispute the apportionment. The money not having been paid, on the 8th of June, 1875, a plaint was issued by the local board in a County Court to recover it from R.'s executor. *Held*, that the limitation of time mentioned in 11 and 12 Vict., chap. 43, § 11, applied as well to proceedings in County Courts as to proceedings before justices, and that the action could not be sustained, it having been brought more than six months after the expiration of the three months allowed for disputing the amount apportioned upon R. *Tottenham Local Board of Health* v. *Rowell*, 1 L. R. Exch. Div. 514; 46 L. J. Q. B. 432; 35 L. T. (N. S.) 887; 25 W. R. 135, D. C. A; S. P., *West Ham Local Board* v. *Maddams*, 33 L. T. (N. S.) 809.

Where a local act required the consent of commissioners to new streets becoming highways, to make the inhabitants liable to repair them, an order of the local board on owners to repair a street, in respect of which such consent had not been given, is lawful, inasmuch as such street was not a highway repairable by the inhabitants at large. *Willes* v. *Wallington*, 13 C. B. (N. S.) 865; 32 L. J. C. P. 86, Exch. Cham.

The Manchester Improvement Act, 1851, enacts in section 17, that the expenses incurred by the town council in sewering and flagging a street shall be borne by the owners, "according to the extent of their respective houses and grounds lying alongside or adjoining to the said street." *Held*, that the owner of ground at the end of a street, forming a *cul de sac*, was liable under this section, although a wall divided his property entirely from the street. *Manchester (Mayor, etc.)* v. *Chapman*, 18 L. T. (N. S.) 640; 16 W. R. 974; 37 L. J. M. C. 173, C. P.

A local board of health has no power to enter upon land without the consent of the owner, for the purpose of making reservoirs and

deposit beds for retaining the sewage. *Sutton* v. *Norwich* (*Mayor, etc.*), 27 L. J. Chanc. 739, V. C. K.

A local board of health is not justified in polluting the surface water which flows by an open gutter into a canal, by diverting into a sewer, and passing the sewage into it. *Manchester, Sheffield and Lincolnshire Railway Co.* v. *Worksop Board of Health*, 23 Beav. 198; 3 Jur. (N. S.) 304; 26 L. J. Chanc. 345.

Where a canal company had a statutory power to supply the canal with water out of such "brooks, streams and water-courses as should be found within a certain distance,"—*Held*, that it would be difficult to hold that the mere surface water of a road, not arising from any spring or natural certain supply, could fall within the act, so far and to such an extent as to exclude a local board of health from making a system of drainage essential to the district, which, offending against the rights of no one in any other particular, merely allowed to flow through gratings into the sewer the water collected on a public road from rain, and from the overflowing of the surplus of the neighboring houses, which water had theretofore flowed down an open gutter into a canal. *Ib.*

Under 11 and 12 Vict., chap. 63, §§ 45, 46 and 145, providing that the local board may make necessary sewers, through or under any lands whatever, and cause them to be emptied into such places as may be fit and necessary, provided that nothing in the act shall authorize the boards to use, injure or interfere with any water-course, stream, river, etc., in which the owner of any lands may be interested without the consent of such owner,—*Held*, that persons having a right to watering places in a river adjoining lands for the use of their cattle are interested in the river within the meaning of the proviso, but would not be able to maintain an action for an interference with their rights, unless they were injured by such interference. *Oldaker* v. *Hunt*, 6 De G., M. & G. 376; 1 Jur. (N. S.) 785.

Held, secondly, that works of a local board of health, producing an outfall of the sewage of a town above such watering place, was such an interference as to cause injury to the land-owners; but that whether this was established or not, it ought (if not consented to by them) to be restrained by injunction, being the act of a public body exceeding its powers. *Ib.* A right of fishing is within the term "land," according to the interpretation clause of the 11 and 12 Vict., chap. 63, § 2. *Ib.*

A local board carried the whole drainage of the town into an adjacent river, a small stream which immediately below the town flowed for three miles through the plaintiff's lands on both sides. The plaintiff was also seized of a mill upon the stream. The quantity of sewage matter thrown into the stream was greatly increased, the population of the town having increased nearly one-half, and the extent of sewers from 250 yards in 1848, to 10,500 yards in 1855; and besides other evidence of that, it appeared that sheep could no longer be washed there, that the fish were all dead, and

that the exhalations were noisome. *Held*, first, that the practice long previously and up to 1848, of a few houses in the town to drain into the river, afforded no ground for the local board setting up a prescriptive right, and that the local board, as a modern corporation, could claim no prescriptive rights. *Attorney-General* v. *Luton Local Board of Health*, 2 Jur. (N. S.) 180, V. C. W. *Held*, secondly, that the stream was a private stream, the property of the plaintiff, and, therefore, that the board had no rights except with his consent. *Ib.*

A local board of health made sewers in execution of the powers of 11 and 12 Vict., chap. 63, and 21 and 22 Vict., chap. 98, and in doing so injuriously affected a stream without having obtained the consent of the occupier of a mill on the stream, and entitled to the flow of the stream to his mill. He obtained a *mandamus* to the local board for compensation, and made a claim, first, for damage sustained in consequence of the board opening the main sewer so as to allow the water of the stream to flow through it for forty-six hours; and secondly, for a drain or a trap-door being made out of the stream, and water allowed to flow out of the stream into the trap-door. *Held*, first, that 21 and 22 Vict., chap. 98, § 73, was not confined to cases in which a court of equity would grant an injunction against the local board, and that the occupier of a mill was in the position of a person who would, if the act had not passed, have been entitled by law to prevent the injuriously affecting the stream. *Reg.* v. *Darlington Local Board of Health*, 6 B. &. S. 562; 35 L. J. Q. B. 45; 13 W. R. 789, Exch. Cham.

Held, secondly, that the works of the local board were not authorized by section 73, and, therefore, the claim of the occupier was not the subject of compensation, but a ground of action. *Ib.*

An annual highway board, constituted under 5 and 6 Wm. IV, chap. 50, acting as a local authority under the Nuisances Removal Act, 18 and 19 Vict., chap. 121 (whole act now repealed except as far as relates to the Metropolis), constructed in 1859 a system of sewers, which conveyed the sewage of their district into a stream, and thus occasioned a nuisance in the adjoining district. *Held*, that the highway board of 1865 could not be compelled to take any steps to remedy the existing nuisance, but that they could be restrained from exercising their statutory powers so as to increase the nuisance. *Attorney-General* v. *Richmond*, 12 Jur. (N. S.) 504; 35 L. J. Ch. 597; 2 L. R. Eq. 306: 14 W. R. 686: 14 L. T. (N. S.) 398 V. C. W.

A sewage company was under covenant with a local board to keep their own works in working order, so as to admit the free flow of sewage from sewers of the board. A demurrer to a bill seeking to restrain the company from causing or permitting sewage to remain in the sewers of the board was overruled. *Nuneaton Local Board of Health* v. *General Sewage Company*. 44 L. J. Ch. 561; 20 L. R. Eq. 127, V. C. B.

By the Public Health *Act, 1875, § 16,* a local authority was

empowered to carry any sewer "into, through or under" any lands within its district, and the act provided for compensation to all persons sustaining damage by reason of the exercise of the powers of the act in relation to any matters as to which they were not themselves in default. A local board under this act proceeded to carry a sewer across private pleasure grounds, on such a level that the bottom of the sewer would be only slightly below the surface, and a permanent embankment about six feet high would be made. *Held*, that the local board was authorized so to do, for that the act did not confine them to carrying a sewer underground. *Roderick* v. *Aston Local Board*, 5 L. R. Ch. Div. 328; 46 L. J. Ch. Div. 802; 25 W. R. 403; 36 L. T. (N. S.) 328, C. A.; affirming decision of the Master of the Rolls, 36 L. T. (N. S.) 170.

An order under the Sanitary Act, 1866, 29 and 30 Vict., chap. 90, § 49 (Parts I, II and III, including this section 49, are repealed, except so far as relates to the Metropolis, or to Scotland or Ireland), reciting that a sewer authority "had made default in providing a proper system of main drainage," and ordering the authority to "do its duty, and begin to set about the works for the purpose within one month from the date of the order, and proceed therewith until completion," is good; and a second order, made after default in complying with the first, appointing a person to "perform the duty of the sewer authority in respect to sewerage, as he should be directed by the Secretary of State," is also good. *Reg.* v. *Cockerell*, 40 L. J. M. C. 153; 19 W. R. 1133; 6 L. R. Q. B. 252.

DRAINS, DITCHES AND OTHER WATER-COURSES.

A natural stream, flowing through and draining agricultural land, was widened, deepened, and otherwise improved, by inclosure commissioners, under a private act, at the expense of the land-owners. In its course it passed through a town, receiving the drainage of two or three houses. *Held*, that it was not thereby converted into a sewer, within 11 and 12 Vict., chap. 63; but even if so, it came within the second exception in section 43, and, therefore, did not vest in the local board, so as to cast upon the board the duty of cleansing and repairing it. *Reg.* v. *Gadmanchester Local Board of Health*, 11 Jur. (N. S.) 63; 5 B. & S. 886; 34 L. J. Q. B. 13; 13 W. R. 155; affirmed on appeal, 5 B. & S. 936; 1 L. R. Q. B. 328; 35 L. J. Q. B. 125; 14 W. R. 375; 14 L. T. (N. S.) 104, Exch. Cham.

A *mandamus* to a local board of health alleged that a drain or a water-course was in such a state as to be a nuisance, injurious to health, and commanded the board to cleanse it. On a return and plea, the stream was found to be in the state alleged. *Held*, that the prosecution was not entitled to judgment, for that the duty of the local board under 11 and 12 Vict., chap. 63, § 58, to cleanse ditches, etc., is only conditional on the neglect of the owner or occupier of the land on which the nuisance exists to remove it after

notice, and no such notice or neglect was alleged in the *mandamus*. *Ib.*

The fact that a water-course is the natural drain of a district, and is polluted to some extent, but not so as to be a nuisance or to prevent a qualified enjoyment of it, by the sewage of some of the houses on its banks flowing or draining into it, does not entitle a local board of health to treat it as a common sewer, and to connect other sewers with it so that it becomes a public nuisance. *Attorney-General* v. *Hackney Local Board*, 33 L. T. (N. S.) 244; 44 L. J. Chanc. 545; 20 L. R. Eq. 626.

When a local board of health is interfering with a water-course in a manner not authorized by the Local Government Act, 21 and 22 Vict., chap. 98, § 68, art. 3, it will be restrained from so doing, and the person injured will not be left to his remedy under the compensation clause of the 11 and 12 Vict., chap. 63, § 144. *Grand Junction Canal Company* v. *Shugar*, 6 L. R. Ch. 483.

By 11 and 12 Vict., chap. 63, § 54, the surveyor of the local board of health may examine any drain, water-closet, privy, cess-pool or ash-pit; and if it is in bad condition, the board shall cause notice in writing to be given to the owner or occupier of the premises, requiring him to do the necessary works; and if such notice be not complied with, the party shall be liable to a penalty for every day during which he makes default. *Held*, that the discretion to determine what works are necessary to be done is vested in the board, and that, on a proceeding before justices to recover the penalty under section 129, they had no jurisdiction to review its determination. *Hargreaves* v. *Taylor*, 3 B. & S. 613; 9 Jur. (N. S.) 1053; 32 L. J. M. C. 111; 11 W. R. 562; 8 L. T. (N. S.) 149.

By a section of a local act, a local board when they think fit may cause the ditches at the sides of, or across public roads and public foot-paths to be filled up, and may substitute pipe or other drains alongside or across such roads. A. was possessed of a freehold close adjoining a public highway. By the side of the highway was a low fence about two feet high, then a strip of green sward averaging ten feet in width, with a broad ditch running parallel to the highway. The close was separated from the strip of green sward by a paling eight feet high. The local board, under the authority of the act of Parliament, filled up the ditch and substituted drain pipes. *Held*, that the ditch being fenced from the highway, the presumption was that it belonged to it, and also, that, as the section referred only to ditches by the side of the highway, the act was not applicable. *Tutil* v. *West Ham Local Board of Health*, 28 L. T. (N. S.) 597; 8 L. R. C. P. 447, C. P.

BUILDINGS.

A local board of health made a by-law, that wherever any open space had been left belonging to any building, such space should never afterward be built upon without the consent of, etc., and without leaving an open space belonging to such building of

specified size and dimensions. *Held*, that if the by-law applied to open spaces belonging to old buildings, it was bad, as exceeding the powers conferred by 21 and 22 Vict., chap. 98, § 34. *Tinker* v. *Rees*, 7 Jur. (N. S.) 629, Q. B.

Lessees had for ninety-nine years a piece of land within the jurisdiction of a local board. The land leased was higher than the street, and was bounded from the street by a wall. They erected a chapel on the land, and in order to approach the chapel, steps were placed on their land. The chapel was erected before the local board was in existence, but the steps and boundary wall were completed afterward. After a resolution of the board and a notice to the lessees, the local board removed the steps and boundary wall and refused compensation. *Held*, that the local board was not justified, under 21 and 22 Vict., chap. 98, and if any by-law authorized the act, such by-law would be unreasonable. *Brower* v. *Holyhead Local Board of Health*, 11 W. R.; 7 L. T. (N. S.) 382, Exch.

The proprietor of a house, which had been erected before the constitution of the district, and was used for an hotel, having a yard with coach-house and stables in the rear, for the purpose of making an addition to the hotel, pulled down the coach-house and stables below the ground floor, and erected upon the site a building three stories high; the only means of access to the upper chambers being by going up the staircase of the old house, and through a passage into the new building. On an information against the proprietor for an offense against the by-law of the local board, made under 21 and 22 Vict., chap. 98, § 34, in not leaving an open space equal to one-third of the area of the ground on which the dwelling-house stood, the justices found that the building erected in the yard, being a new building, built up to and adjoining the old building, must either be considered with the old building as one house, or that the old house and new building must be considered as two erections, and that both old and new buildings must be considered in reckoning the ground upon which the building stood, and convicted him of a breach of the by-law. *Held*, that the conviction could not be sustained because the new erection was not a new dwelling-house, but merely an addition to an old dwelling-house, or because the justice had not found that it was a new dwelling-house, which was essential to the validity of the conviction. *Shiel* v. *Sunderland* (*Mayor, etc.*), 6 H. & N. 796.

An owner of a factory, being desirous of rebuilding his premises, submitted the plans to a committee, to whom the town council, also the local board of health, delegated their powers, and the plans having been approved, pulled down the factory and proceeded to rebuild it according to such plans. The town council, under the 21 and 22 Vict., chap. 98, § 35, relating to buildings to be erected, having required him to set back his premises, the court restrained them, by injunction, from interfering with the erection of the factory according to the approved plans. *Slee* v. *Bradford* (*Mayor, etc.*), 4 Giff. 262; 9 Jur. (N. S.) 815; 8 L. T. (N. S.) 491.

A by-law made by a local board, which provides that if any power or person should construct or cause to be constructed any works, or do any act, or omit to do any act, or to comply with any requirement of the local board, or should make any alterations in any works after they have been completed, whether in new or existing buildings, contrary to the provisions therein contained, the local board might cause such works to be removed, altered or pulled down, is invalid, as exceeding the powers conferred by 21 and 22 Vict., chap. 98, § 34. *Brown* v. *Holyhead Local Board of Health*, 1 H. & C. 601; 32 L. J. Exch. 25.

A by-law by a local board of health, imposing continuing penalties on any person who shall construct any works, or do, or omit to do any act or to comply with any requirements of the board, or shall make any alteration or deviation in any plan approved by the board whether in new or existing buildings, contrary to the provisions therein contained, or shall do any act, matter or thing contrary to the by-laws made under the authority of the 21 and 22 Vict., chap. 98, § 34, or shall omit, neglect or fail to perform any of the work, matters or things required by such by-laws, and empowering the board to remove, alter, pull down, or otherwise deal with such work, as the case may require, is invalid, as exceeding the authority given by the 21 and 22 Vict., chap. 98. *Young* v. *Edwards*, 23 L. J. M. C. 227; 11 L. T. (N. S.) 424, Exch. But see *Hall* v. *Nixon*, 10 L. R. Q. B. 152; 44 L. J. M. C. 51, 55; 32 L. T. (N. S.) 87; 23 W. R. 612.

MAKING AND VALIDITY OF RATES, GENERALLY.

The effect of the order of the general board of health and of the 11 and 12 Vict., chap. 63, is to repeal the rating powers given by local acts. *Elmer* v. *Norwich Local Board of Health*, 3 El. & Bl. 517; 2 C. L. R. 886; 18 Jur. 870; 23 L. J. Q. B. 203.

Notice was given by a local board of health of an intention to make a rate under the Public Health Act, 1848, and amending acts. Before the notice had expired these acts were repealed by the Public Health Act, 1875, 38 and 39 Vict., chap. 55, which contained a saving of "any thing duly done" under the repealed enactments, and gave power to make a similar rate upon giving a similar notice. The board, in ignorance of the repeal, made a rate purporting to be made under the repealed acts. *Held*, that the rate was valid, the notice being a "thing duly done," and the accidental reference in the rate to the repealed acts being immaterial to its validity. *Reg.* v. *West Riding of Yorkshire (Justices)*, 1 L. R. Q. B. Div. 220; 45 L. J. M. C. 97; 35 L. T. (N. S.) 358.

The maintenance of the highways within the district of a local board must be provided for by a district rate, and not by a highway rate, whether the district is or is not conterminous with an ancient parochial division. *Taff Railway Company* v. *Cardiff Local Board of Health*, 8 El. & Bl. 535.

By the Walsall Improvement and Market Act, 1848, commis-

sioners had power to levy an improvement rate within a district not comprising the whole municipal borough as afterward constituted, but the act contained a proviso that the occupiers of land used as a railway should be assessed in proportion only of one-fourth part of the net value. The Public Health Acts, 1872 and 1875, formed the whole municipal borough of Walsall into an urban sanitary district. *Held*, that the assessment ought to be made under the local act and not under the Public Health Acts. *London & North Western Railway Company* v. *Walsall* (*Overseers*), 35 L. T. (N. S.) 626; 25 W. R. 59, Q. B.

The word "railway" in the proviso, 11 and 12 Vict., chap. 66, § 88, meant the way on which carriages actually go, including the line itself, the turn-tables and the sidings; and land used only for the purpose of supporting this way, as for embankments, etc., is within the proviso, and to be assessed at the lower rate. But the adjuncts, such as stations and warehouses, though necessary for the working of the railway, did not form part of it within the proviso, and land used for these latter purposes was assessable at its full and annual value. *South Wales Railway Company* v. *Swansea Local Board of Health*, 4 El. & Bl. 189; 1 Jur. (N. S.) 326; 24 L. J. M. C. 30.

By the Public Health Act, 1872, 35 and 36 Vict., chap. 79, § 43, any limit imposed on or in respect of any rate by any local act of Parliament shall not apply to any rate required to be levied for the purpose of defraying any expenses incurred by a sanitary authority for sanitary purposes. *Held*, that this provision does not make ratable any premises which, under the local act, were altogether exempt from rates. *Walton* (*Commissioners*) v. *Walford*, 23 W. R. 292; 10 L. R. Q. B. 180; 44 L. J. Q. B. 74.

A *mandamus* lies to a local board of health to make a rate in aid of a judgment within six months after the judgment is obtained, though the action in which it was obtained is commenced more than six months after the claim accrued, if the delay in bringing the action is excused, and shown not to have been undue delay. *Worthington* v. *Hutton*, 1 L. R. Q. B. 63; 6 B. & S. 943; 12 Jur. (N. S.) 73; 35 L. J. Q. B. 61 · 14 W. R. 632; 13 L. T. (N. S.) 463.

CONTRACTS.

A local board of health for a non-corporate district gave notice to the owners of the premises fronting, adjoining or abutting on certain streets, requiring them to sewer, level, pave, flag and channel the same, which notices not being complied with within the specified time, the board entered into contracts with a third person for their performance; which contained provisions that the contractor was to be paid for the work when the money was collected from the owners of the adjacent properties; the work was done accordingly, but the owners having refused payment, justices before whom they were summoned for non-payment dismissed the summonses. *Held*, that the contractor was entitled to sue the board of health for the work done by him under the contracts. *Worthington* v. *Sudlow*, 2 B.

& S. 508; 31 L. J. Q. B. 131; 8 Jur. (N. S.) 668; 10 W. R. 621; 6 L. T. (N. S.) 283.

ACTIONS FOR NEGLECT OF DUTY, INJURIES TO PROPERTY OR PERSONS, ETC.

A local board of health constructed a sewer along the bank of a river, with trap-doors in it, communicating with the river. When the river was full, and water abundant, the board, by means of the trap-doors, drew the water off from the river, and let it into the sewer for the purpose of flushing it. The place where the trap-doors were placed was at a part of the river above that on which a mill, occupied, was situated. On one occasion the board made a hole in the bottom of the river, and so let the stream run into the sewer for nearly two days continuously, during that time obstructing the water of the river in such quantities that the mill ceased working for want of water. *Held*, that the acts of the board were in excess of the powers given them by statute; that they had injuriously affected the river; and that the owner of the mill might have brought an action for the wrong, and also, in such action, obtained an injunction against the continuance of it; that he was, therefore, an individual entitled by law to prevent or to be relieved against the injuriously affecting the river within 21 and 22 Vict., chap. 98, § 73; and consequently that he could not sustain a *mandamus* against the board to summon a jury to assess him compensation. *Darlington Local Board of Health, in re*, 35 L. J. Q. B. 45; 13 W. R. 789; 6 B. & S. 562, Exch.

An action will lie against a local board of health of a corporate district, as a body, for negligence in carrying out works within its powers, so as to cause injury to any person, *e. g.*, for so negligently and improperly constructing a sewer as to cause a nuisance by its discharge. *Southampton and Hitchin Bridge Company* v. *Southampton Local Board of Health*, 8 El. & Bl. 801; 4 Jur. (N. S.) 1298; 28 L. J. Q. B. 41.

In an action against a local board of health for damages sustained by an irruption of sewerage caused by the sewers being improperly constructed, former applications by the plaintiff to the board for compensation on similar occasions, with their answers, awarding compensation, are admissible on his part. Although the fact that such application was made will not settle the question of responsibility for a particular sewer, coupled with the fact that on the occasion in question the board appeared only to dispute their liability on the ground that the occurrence was occasioned by an extraordinary storm, and with some (even though slight) evidence that it was caused by defective construction of the sewers, there will be sufficient evidence of liability. Nor will there be sufficient evidence that a storm was so extraordinary as to excuse the parties responsible for the sewers, unless the evidence extends over a considerable range of years, during which the sewers have been in existence. *Brown* v. *Sargent, 1 F. & F. 112, Exch.*

A local board of health is not liable to an action for permitting a public footway in their district to be out of repair, whereby the plaintiff was injured. *Gibson* v. *Preston* (*Mayor, etc.*), 10 B.& S. 942; 22 L. T. (N. S.) 293; 18 W. R. 689.

A person riding along a highway, under which was a sewer the property in which was vested in the local board of health, his horse trod upon a defective grid or grating put there to drain the surface water off the road into the sewer, the grid gave way and his horse's leg was injured. He brought an action against the local board of health of the district, who were likewise the surveyors of the highway. *Held*, that though the local board might not be liable as surveyors of the highway, they were liable as owners of the sewer, of which the grid formed part, for negligence in not keeping the grid in a proper state. *White* v. *Hindley Local Board of Health*, 10 L. R. Q. B. 219; 44 L. J. Q. B. 114; 32 L. T. (N. S.) 460; 23 W. R. 651.

Members of a local board of health are not personally liable for expenses incurred by a witness instructed by the board. *Binley* v. *Cuckson*, 7 W. R. 16; 32 L. T. 124, Q. B.

Section 264 of the Public Health Act, 1875, requiring a month's notice to be served on a local authority before commencing an action for any thing done under the provisions of the act, does not apply where the object of the action is to restrain the commission of a nuisance, and this notwithstanding the plaintiff also claims compensation for past damage. *Flower* v. *Low Leyton Local Board*, 46 L. J. Ch. Div. 621; 5 L. R. Ch. Div. 347; 36 L. T. (N. S.) 760; 25 W. R. 545, C. A., reversing the decision of MALINS, V. C., 36 L. T. (N. S.) 236; 25 W. R. 423.

COMPENSATION FOR DAMAGES; ARBITRATION AND UMPIRAGE.

A board of health is not bound to give compensation for any damage which it may cause, which would not have been actionable if it had not been acting under the authority of the statute. *Hull* v. *Bristol* (*Mayor, etc.*), 2 L. R. C. P. 322; 36 L. J. C. P. 111; 15 W. R. 404; 15 L. T. (N. S.) 572.

An occupier of a mill situate on a river, and the representative of the riparian proprietor, being entitled to the uses of the water for the purposes of the mill, obtained a *mandamus* against a local board of health on the following grounds: First, that they constructed a sewer, running partly alongside of, and partly under, the river, commencing at a point above, and terminating at a point below the mill, for the flushing of which a portion of the waters of the river was admitted and diverted for two days, during which the mill was hereby prevented from working. Secondly, for the loss of water occasioned by reason of the percolation of underground springs into the sewer, which would otherwise have found their way into the river; and also the percolation of water from the river into the sewer; thirdly, for the construction of trap-doors into the same, which were occasionally opened for the purpose of flushing it; and

fourthly, for the diversion of the surface drainage waters of the town into the sewer, which before had been conveyed by artificial drains into the river. *Held* (assuming the injuries to have been such as to form just ground of complaint), that the remedy was not by *mandamus*, but by action. *Reg.* v. *Darlington Local Board of Health*, 10 Jur. (N. S.) 1196; 33 L. J. Q. B. 305; 6 B. & S. 562; 12 W. R. 1034; 10 L. T. (N. S.) 602.

JURISDICTION OF ARBITRATORS.

When an arbitrator has been appointed by one party, under the provisions of the Public Health Act, 1875, §§ 179, 180, his jurisdiction is not ousted by the other party denying his liability and refusing to appear. *Burgess* v. *Norwich Local Board*, 26 W. R. 19; 37 L. T. (N. S.) 355, C. P. Div.

In *Ringland* v. *Lowndes*, 10 Jur. (N. S.) 850; 33 L. J. C. P. 337; 17 C. B. (N. S.) 514; 12 W. R. 1010, Exch. Cham., it was held, that the local board which had, by its clerk, at the time of the reference before the umpire, protested against the proceedings, but had, nevertheless, gone into the case, examined witnesses, and addressed the umpire, was stopped from afterward disputing the umpire's jurisdiction.

PROCEEDINGS FOR PENALTIES.

The Public Health Act, 1875, § 253, enacts that proceedings for the recovery of a penalty under that act shall not be "taken by any person other than by a party aggrieved," or by a local authority, without the consent of the Attorney-General; and by sch. 2, r. 70, a penalty of £50 is imposed upon any person acting as a member of a local board without qualifications. The defendant, who was acting as a chairman of a local board after disqualification, made a complaint to the members thereof as to certain conduct of the plaintiff, who was clerk to the board; the plaintiff, fearing that he might be dismissed from his office, resigned it, and sued the defendant to recover a penalty of £50 for acting without qualification. *Held*, that the plaintiff was not "a party aggrieved" within the meaning of the Public Health Act, 1875, § 253, and that he could not sue for the penalty without the consent of the Attorney-General. *Rochfort* v. *Atherly*, 1 L. R. Exch. Div. 511; S. C., *nom. Smith* v. *Fieldhouse*, 35 L. T. (N. S.) 602.

In *Hollis* v. *Marshall*, 2 H. & N. 755, it was held that a candidate for the office of commissioner, under the Cheltenham Improvement Act, was not a party aggrieved by the defendant, the successful candidate, who was not duly qualified, acting as a commissioner. The plaintiff alleged that he was aggrieved as a rate-payer, voter, and resident within the borough, and also as such candidate. This case arose under the repealed act 11 and 12 Vict., chap. 63, § 133, which section was incorporated into the local improvement act of the borough in question.

PROCEEDINGS BEFORE JUSTICES.

By the Public Health Act, 1875, § 126, subs. 2, any person who, while suffering from an infectious disorder, willfully exposes himself, without proper precautions against spreading the disorder, in any street or public place, or who, being in charge of any person so suffering, so exposes such person, is subject to a penalty.

A medical man, in practice at Tunbridge, sent a patient, who was suffering from scarlet fever, to the fever hospital there, with a certificate, directing him to walk in the middle of the road, and not to talk to any one; but, in consequence of an alleged informality in the certificate, the patient was refused admission; whereupon the medical man walked with him through the streets of the town to the residence of the chairman of the local board, from whom, after some delay, he obtained an order for the man's admission to the hospital. He then returned with the patient to the police-station to procure the ambulance to convey him thither. Upon an information against the medical man for an alleged infringement of the statute, the justices were of opinion that it was not proved before them that the medical man had charge of the patient, that he had not willfully exposed the patient in any street or public place without proper precaution, and that he had made the best use of the means at his disposal to prevent the spread of the fever; and they refused to convict him. *Held*, that their decision was right. *Tunbridge Wells Local Board* v. *Bisshopp*, 2 L. R. C. P. Div. 187.

The owners of a house and area, situate in and fronting a street, altered the front of the house by throwing out bay-windows, projecting beyond the street line of frontage, but not beyond the limits of the area. After the completion of the alterations, the local authority threatened them with summary proceedings before the justices for the recovery of penalties under the Public Health Act, 1875, on the ground that they had set forward their building without the written consent of the local authority, under section 156. The owners then moved *ex parte* for an injunction to restrain the local authority from taking these proceedings, alleging that as the alterations had been made over their own property, the local authority, in threatening proceedings, were acting *ultra vires;* that they having had notice of the intention of the owners to make the alterations, were bound by acquiescence; and that the justices had no jurisdiction, as the local authority had not made their complaint within six months after the alleged offense, as required by section 252. The injunction was refused. *Kerr* v. *Preston* (*Corporation*), 6 L. R. Ch. Div. 463; 46 L. J. Chanc. Div. 409; 25 W. R. 264, R.

The 38 and 39 Vict., chap. 55, known as the Public Health Act of 1875, forms now the basis of all legislation on the subject of the public health generally. For the most part all prior acts are by it more or less repealed, and when, therefore, an act is spoken of as simply repealed, it may be assumed that this statute is referred to as the repealing act in such case.

PUBLIC HEALTH LAW IN THE UNITED STATES.

State Quarantines.

I. The quarantines and other restraints established by the health laws of any State, or pursuant thereto, respecting vessels arriving in or bound to any port or district thereof, required to be duly observed by collectors and all other officers of the revenue of the United States, and by masters and crews of revenue cutters, and by military officers in any fort or station upon the sea coast. Such officers authorized and required faithfully to aid in the execution of such quarantines and health laws, according to their respective powers and precincts, and as they shall be directed from time to time by the Secretary of the Treasury of the United States. The Secretary is authorized when a conformity to such quarantines and health laws shall require it, and in respect to vessels which shall be subject thereto, to prolong the terms limited for the entry of the same, and the report or entry of their cargoes and to vary or dispense with any other regulations applicable to such reports or entries. *Provided, etc.* Act of February 25, 1799, § 1; 1 Stat. at Large, 619; 1 Bright. 810.

II. When by the health laws or regulations of a State, any vessel arriving within a collection district of such State shall be prohibited from coming to the port of entry or delivery for such district, and it shall be required or permitted by such health laws that the cargo of such vessel be unladen at some other place within, or near to such district, the collector may grant permit for the unlading thereof at some other place where such health laws shall permit. Provisions for unlading, custody, and delivery of the cargo. *Ib.*, § 2.

III. There shall be purchased or erected under the orders of the President of the United States, suitable warehouses with wharves, and inclosures where goods and merchandise may be unladen and deposited from any vessel which shall be subject to a quarantine, or other restraint, pursuant to the health laws of any State as aforesaid, at such convenient place or places therein, as the safety of the public revenue and the observance of such health laws may require. *Ib.*, § 3.

IV. *During prevalence of any contagious or epidemical disease*, in the port of entry for any collection district, the Secretary, or in his absence, the Comptroller of the Treasury of the United States, may authorize the removal of the collector, and the officers employed in his department, from such port, to any other more convenient place within or as near as may be to such collection district, where such collector and officers may exercise the same authorities, and shall be liable to the same duties, according to existing circumstances, as in such lawful port or district; and of such removal public notice shall be given as soon as may be. *Ib.*, § 4.

V. It shall be lawful for the judge of any District Court of the United States, within whose district any contagious or epidemical

disease shall at any time prevail, so as in his opinion to endanger the life or lives of any person or persons confined in the prison of such district in pursuance of any law of the United States, to direct the marshal to cause the person or persons confined as aforesaid, to be removed to the next adjacent prison where such disease does not prevail, there to be confined until he, she, or they may safely be removed back to the place of their first confinement; which removal shall be at the expense of the United States. *Ib.*, § 5.

VI. In case of the prevalence of a contagious or epidemical disease at the seat of government, it shall be lawful for the President of the United States to permit and direct the removal of any or all the public officers to such other place or places as, in his discretion, shall be deemed most safe and convenient for conducting the public business. *Ib.*, § 6.

VII. Adjournment of Supreme Court, Circuit Court, or District Court, authorized, whenever prevalence of such disease renders it hazardous to hold session. *Ib.*, § 7.

1. No vessel or vehicle coming from any foreign port or country where any contagious or infectious disease may exist, and no vessel or vehicle conveying any person or persons, merchandise or animals, affected with any infectious or contagious disease, shall enter any port of the United States or pass the boundary line between the United States and any foreign country, contrary to the quarantine laws of any one of said United States, into or through the jurisdiction of which said vessel or vehicle may pass, or to which it is destined, or except in the manner and subject to the regulations to be prescribed as hereafter provided. Act of April 29, 1878, chap. 66, § 1; 20 Stat. at Large, 37.

2. "Whenever any infectious or contagious disease shall appear in any foreign port or country, and whenever any vessel shall leave any infected foreign port, or having on board goods or passengers coming from any place or district infected with cholera or yellow fever, shall leave any foreign port, bound for any port of the United States, the consular officer, or other representative of the United States at or nearest such foreign port shall immediately give information thereof to the supervising surgeon-general of the Marine Hospital service, and shall report to him the name, the date of departure, and the port of destination of such vessel, and shall also make the same report to the health officer of the port of destination in the United States, and the consular officers of the United States shall make weekly reports to him of the sanitary condition of the ports at which they are respectively stationed."

Powers and duties of surgeon-general, in execution of the act declared. *Ib.*, § 2.

3. Powers and duties of surgeon-general, of medical officers, and customs officers declared. *Ib.*, §§ 3, 4.

4. "Whenever at any port of the United States, any State or municipal quarantine system may now, or may hereafter exist, the officers or agents of such system shall, upon the application of the

respective State or municipal authorities, be authorized and empowered to act as officers or agents of the national quarantine system, and shall be clothed with all the powers of United States officers for quarantine purposes, but shall receive no pay or emoluments from the United States. At all other ports where, in the opinion of the Secretary of the Treasury, it shall be deemed necessary to establish quarantine, the medical officers or other agents of the Marine Hospital service shall perform such duties in the enforcement of the quarantine rules and regulations as may be assigned them by the surgeon-general of that service under this act: *Provided*, that there shall be no interference in any manner with any quarantine laws or regulations as they now exist or may hereafter be adopted under State laws." *Ib.*, § 5.

5. *National Board of Health.*—"There shall be established a National Board of Health, to consist of seven members, to be appointed by the President, by and with the advice and consent of the Senate, not more than one of whom shall be appointed from any one State, whose compensation, during the time when actually engaged in the performance of their duties under this act, shall be $10 per diem each, and reasonable expenses, and of one medical officer of the army, one medical officer of the navy, one medical officer of the Marine Hospital service, and one officer from the department of justice, to be detailed by the Secretaries of the several departments and the attorney-general, respectively, and the officers so detailed shall receive no compensation. Said Board shall meet in Washington, within thirty days after the passage of this act, and in Washington or elsewhere, from time to time, upon notice from the president of the board, who is to be chosen by the members thereof, or upon its own adjournments, and shall frame all rules and regulations authorized or required by this act, and shall make or cause to be made such special examinations and investigations, at any place or places within the United States, or at any foreign ports, as they may deem best, to aid in the execution of this act, and the promotion of its objects." Act of March 3, 1879, chap. 202, § 1; 20 Stat. at Large, 37.

6. "The duties of the National Board of Health shall be to obtain information upon all matters affecting the public health, to advise the several departments of the government, the executives of the several States, and the commissioners of the District of Columbia, on all questions submitted by them, or whenever, in the opinion of the Board, such advice may tend to the preservation and improvement of the public health." *Ib.*, § 2.

ALABAMA.

Title 13, *chap.* 4, *Feb.* 19, 1875, p. 130.

SECTION 1. The Medical Association of the State of Alabama, organized in accordance with the provisions of the Constitution, which was adopted by the association at its annual meeting, in the city of

Tuskaloosa, in March, 1873, is constituted the Board of Health of the State. § 1536.

§ 2. The Board of Health of this State shall take cognizance of the interests of health and life among the people of the State; shall investigate the causes and means of prevention of endemic and epidemic diseases; shall investigate the influences of localities and employments upon the public health; shall from time to time make to the General Assembly, such suggestions as to legislative action as, in their judgment, may seem advisable, and shall be in all ways the medical advisers of the State. § 1537.

§ 3. The Board of Health shall make to the Governor, for transmission to the General Assembly, an annual report of their investigations and transactions, of which annual report there shall be published as other reports transmitted through the Governor to the General Assembly, a sufficient number of copies for distribution among the members of the General Assembly, and the members of the Board of Health of the State, and such additional numbers as may be deemed advisable, for the purpose of exchanging for reports of similar associations in other States. § 1538.

§ 4. The county medical societies in affiliation with the Medical Association of the State, and organized in accordance with the provisions of the Constitution, are constituted boards of health for their respective counties, and as such shall be under the general direction of the Board of Health of the State. § 1539.

§ 5. The county boards of health thus established shall have only advisory powers, and shall be conducted without expense to the State, or to their respective counties, except under the condition provided for under section following. § 1540.

§ 6. The competent legal authority of any county in this State, or of any incorporated city or town of any such county, shall, whenever, in their judgment, it becomes expedient to do so, invest the board of health of the county with such executive powers and duties for the promotion of the public health, and under such rules and stipulations as may be agreed upon between the two parties. § 1541.

§ 7. In any such agreement as is contemplated in the preceding section, the right to elect or appoint the officers and servants employed in the administration of the sanitary regulations so agreed upon shall, in all cases, be reserved to the Board of Health; and all questions relating to salaries, appropriations and expenditures shall be reserved to the legal authorities of the county, town, or city. § 1542.

§ 8. No board of health, nor advisory nor executive medical body of any name or kind, for the exercise of public health functions, shall be established by authority of law in any county, town or city of this State, except such as is contemplated by the provisions of this chapter; but nothing in this chapter shall be so construed as to prevent any of the boards of health created herein from accepting and executing any special powers that may be granted them by the General Assembly of the State. But this chapter may

be changed, modified or repealed at any time at the pleasure of the General Assembly. § 1543.

Title 13, *chap*. 2. When any health officer in any town makes complaint, on oath, that there is good cause of suspicion or belief that there is on any premises in such town, or in any vessel within its limits or vicinity, any cause of disease or infection, necessary to be destroyed or removed, or one or more persons, strangers to the place, infected with a dangerous contagious disease, and that he has been refused admission, any justice of the corporation or county in which such lot, house or vessel is, may issue his warrant to the proper officer, directing him to enter such premises or vessel, and, under direction of the health officer, to remove such infected person, and remove or destroy such source of infection or disease. § 1505.

All expenses incurred in executing such warrant, and for maintaining, nursing and curing any person removed under the provisions of this chapter, must be paid by such person, or the owner of the premises or vessel; or, if not so paid, then by the town (including city), the person by whom such should have been paid remaining liable. § 1506.

Any person coming into any town by land, from a place infected with a contagious disease, may be compelled to perform quarantine by the health officer, and restrained from traveling until discharged. § 1512.

CALIFORNIA.

§ 3008. *Powers of health officer.*—He may, in his discretion, cause the removal to a hospital of any and all persons, within the limits of the city and county of San Francisco, infected with variola. *Amendment approved March* 9, 1878.

§ 3061. It shall be the duty of the board of trustees, council or other corresponding board, of every incorporated town and city of this State, to establish, by ordinance, a board of health for such town or city, to consist of five persons, one at least of whom shall be a practicing physician and a graduate of some reputable school of medicine, and one, if practicable, a civil engineer. Every local board of health established in this State must:

First. Supervise all matters pertaining to the sanitary condition of their town or city, and make such rules and regulations thereto, as are necessary and proper, and not contrary to law.

Second. Report to the Secretary of the State Board of Health at Sacramento, at such times as the State Board of Health may require:

a. The sanitary condition of their locality.

b. The number of deaths, with the cause of each as near as can be ascertained, within their jurisdiction, during the preceding month.

c. The presence of any epidemic or other dangerous, contagious

or infectious disease, and such other matters within their knowledge or jurisdiction as the State Board may require.

The trustees, council or other legislative board, by whatever name known, of any incorporated city or town of this State, may by ordinance adopt any portion of articles 3 and 4 of this chapter, or either of them, for some definite period of time, as may seem proper for the regulation of sanitary matters within their town or city. *Amendment approved March* 19, 1878; *amendments March* 9, 1877–8, 59, *took effect immediately.*

[The act of March 19, 1878, from which the foregoing amendment is taken, contained the following additional section:

§ 2. This act shall not extend to any incorporated city or town, or city or county, for which health regulations are provided by special statutes.]

§ 3033. Whenever it shall be certified to the Board of Health, by the health officer, that any building, or part thereof, is unfit for human habitation, by reason of its being so infected with disease as to be likely to cause sickness among the occupants, or by reason of its want of repair has become dangerous to life, said Board may issue an order, and cause the same to be affixed conspicuously on the building, or part thereof, and to be personally served upon the owner, agent or lessee, if the same can be found in this State, requiring all persons therein to vacate such building, for the reasons to be stated therein as aforesaid.

Such building, or part thereof, shall within ten days thereafter be vacated, or within such shorter time, not less than twenty-four hours, as in said notice may be specified; but said Board, if it shall become satisfied that the danger from said house has ceased to exist, may revoke said order, and it shall thenceforth become inoperative. *New section approved March* 9, 1878; *amendments* 1877–8, 58; *took effect from passage; repealing conflicting acts.*

§ 3034. Every physician in the city and county shall report to the health officer, in writing, every patient he shall have laboring under Asiatic cholera, variola, diphtheria, or scarlatina, immediately thereafter, and report to the same officer every case of death from such disease, immediately after it shall have occurred.

§ 3026. Superintendents of cemeteries within the boundaries of the city and county of San Francisco must return to the health officer, on each Monday, the names of all persons interred or deposited within their respective cemeteries for the preceding week. *Amendments approved March* 9, 1878; *amendments* 1877–8, 57; *took effect from passage; repealing conflicting acts.*

§ 3009. The Board of Health *must* appoint a quarantine officer, who shall be a physician in good standing, a secretary, one assistant secretary, six health inspectors, one market inspector, and one messenger, whose duties must be fixed by the Board of Health; they must also appoint one superintendent physician, one resident physician, one steward, one matron, one apothecary, two visiting physicians, two visiting surgeons, as officers of the city and county

hospital in and for the city and county of San Francisco, one each of said visiting physicians and surgeons to be nominated by the faculty of the medical department of the University of California, and one each of such visiting physicians and surgeons to be nominated by the Medical College of the Pacific. Said Board may also appoint one engineer for the city and county hospital. They may also appoint one superintendent, one resident physician, one matron, and such other employees as are now authorized by law to be employed in and for the alms-house of said city and county. They shall have also power to appoint and prescribe the duties of one city physician and one assistant city physician, who shall be designated as police surgeons, and whose duty it shall be to make all autopsies required of them by the coroner of said city and county. And such Board is also empowered to appoint such employees and such medical attendants as they may deem necessary in the health department, and in all the various institutions which are by law placed under their supervision; and the compensation of such employees and medical attendants shall be fixed by the Board of Health. The appointing power aforesaid is vested solely in said Board of Health, and said Board shall have power to prescribe the duties of said appointees, and shall not remove the same without just cause. The heads of departments appointed by the Board of Health, to-wit: The health officer, resident physician of city and county hospital, and superintendent of alms-house, shall not be removed except by a concurrence of four members of said Board of Health. *Amendment approved March 9, 1878; amendments 1877–8, 52; took effect from passage; repealing conflicting acts.*

SOUTH CAROLINA.

There does not appear to be in this State any provision for the establishment of local boards of health for cities, towns or villages, but there is specific legislation on the subject of quarantine, to-wit, chapter 33 of the Revised Statutes (A. D. 1873); No. 141, Statutes at large, § 2 (A. D. 1879). The quarantine laws are of very similar import to those existing in other States, previously referred to, an appeal being also given to any person aggrieved by any decision or order of the health officer to the Governor, Attorney-General and Comptroller-General, constituting a board of appeal. By chapter 34 of the Revised Statutes power is also given to the Governor to make such regulations as he may deem necessary to prevent the entrance of Asiatic cholera and prevent the spreading of it in the State.

NORTH CAROLINA.

By chapter 117 (A. D. 1879) it is enacted that the Medical Society of North Carolina shall choose from its active members, by ballot, six members, and the Governor shall appoint three other persons (of whom one shall be a *civil engineer*) to constitute the Board of

Health; that this Board shall make sanitary investigations and quiries, the causes especially of epidemics, the sources of mortali the effects of locations, employments, and conditions upon pul health; they shall be the medical advisers of the State. The me bers shall be chosen, two for six years, two for four and two for t They shall receive no pay except when on actual duty.

There shall be an auxiliary board of health in each county. Th boards shall consist of the physicians eligible to membership in State Medical Society, the mayor * * * of county town, chairman of the county commissioners, and the city surveyor, ot wise the county surveyor. From this number one physician to chosen, to act for two years, with the title of superintenden health. His duty shall be to gather vital statistics (*inter alia*).

These boards of health are to be subordinate to the State Boa Inland quarantine shall be under the control of the superintend who, acting under the advice of the local board, shall see that sm pox, scarlet fever, yellow fever and cholera shall be properly q antined or isolated (at the expense of the city or town in which occurs).

Any violation of the rules promulgated shall subject the offen to a fine of $2,500, and imprisonment for not longer than twe days in the public jail.

Abatement of Nuisances.

Upon due notification of the existence of a nuisance upon premises the parties failing to abate the same shall pay a fine of dollar a day, dating from twenty-four hours after the notification been served, *provided* that if the party notified is unable to ca out the directions of the superintendent, it shall be done at the pense of the town or city.

The State Board of Health shall keep a supply of fresh ani vaccine virus. The county superintendents shall vaccinate and vaccinate all applying for such service, free of charge, and sl vaccinate every person admitted into a jail, work-house, poor-house public school, unless they be satisfied that such person is already cessfully vaccinated. There are other duties connected with coron inquests which devolve upon him, but they relate to the ends justice rather than to the public health.

COLORADO.

By section 3 of an act of the Legislature of this State (A. 1879), amending "An act to reduce the law incorporating the c of Denver," etc., the city council shall cause sewers to be c structed in any district whenever the Board of Health recomme the same as necessary for sanitary reasons, and said recommendati is approved by the city council.

And by an act of the same date a sum of $800 is appropriated of any money in the State treasury, not otherwise appropriated, 1

the expenses of the State Board of Health during the years 1879 and 1880.

CONNECTICUT PUBLIC HEALTH.

§ 1. By chapter XI, title 16 of the Revised General Statutes of Connecticut, the justices of the peace and selectmen in each town shall establish a board of health and have all the power necessary and proper for preserving the public health and preventing the spread of malignant diseases therein, and may appoint a president and health officers or health committees and delegate to them their powers. Any number of members at a properly convened meeting shall be a quorum, and may appoint a clerk to record the acts of the board.

§ 2. Duty of board to examine into all nuisances and sources of filth injurious to the public health, and cause the removal of all filth within town; all expenses incurred to be paid by offending party, and if not known, then by the town. The owner or occupant of private property on which such nuisances are found shall, if he neglect to remove the same after notification, be fined not less than twenty dollars nor more than one hundred dollars, and pay the expense and costs of such removal, and after expiration of time allowed for such removal, board may abate or remove such nuisance, and such board, health officer, or committee may enter all premises where they have cause to suspect such nuisance or filth to exist.

§ 3. Any one willfully violating any of the rules of the board, after due notice and publication of them, shall forfeit not less than fifteen dollars nor more than one hundred dollars.

§ 3. The board of health in any town contiguous to navigable waters may assign where any vessels shall, if need be, perform quarantine.

§ 9. No master of a vessel liable to perform quarantine shall fraudulently attempt to evade or elude quarantine by false declarations, or suffer to be landed any person or thing contrary to the provisions of this act, or permit any person to board such vessel before it shall have been visited by the officer of health.

§ 10. Health officer or member of the board of health may, under directions of the board, direct any vessel liable to quarantine to be cleansed, and any sick persons found therein to be removed and cared for, and any passenger, and such of the mariners as the master may not require, to be removed on shore and secluded for fourteen days; any person visiting, without permission, any person so confined, shall be liable to a like confinement and penalty.

§ 12. Board of health of any town may interdict communication tween it and any town or place in which any contagious or malignt disease is prevalent.

§ 13. Every taverner or lodging-house keeper shall, within twelve urs of any lodger falling sick of any malignant or contagious ease, between 1st May and 1st November, report the same in iting to board of health.

§ 14. Any justice of the peace may issue his warrant to any proper officer, or indifferent person, if need be, requiring him to execute the same.

§ 16. Boards of health may order into confinement, in any place to be designated by the board, any person whom they have reasonable ground to believe to be infected, etc.

§ 17. Boards of health may adopt rules for vaccination, the expenses, in whole or in part, to be paid out of the town treasury.

§ 18. Any person refusing to be vaccinated, unless in the opinion of a physician other than the physician of the board of health, it would not be prudent on account of sickness, shall forfeit $5 to the town.

§ 19. Every person violating any provision of the preceding sections, for which no other penalty is provided, shall be fined not exceeding $500, or imprisoned not exceeding six months, or both.

DELAWARE.

By Revised Statutes of this State (A. D. 1874), chapter 46, the Governor shall appoint three physicians in each county to be health officers for such county.

Their duties shall be to board vessels and investigate the state of the persons and cargo.

Health officers may refuse to permit landing of any person or goods upon making a report thereof to the proper authorities, and may refuse permisson to any person to go on board such vessel.

The proper authorities, therein specified, may, under the advice of the health officer, make proclamation of the prevalence of any infectious disease in any port or place, and all placed on board any vessel from such port or place shall be subjected to quarantine, and the vessel be not allowed to approach within certain limits therein mentioned.

And further, if any person traveling on foot from any infected place, shall after proclamation issued, enter any place thus proscribed, or shall violate any of the regulations, he shall forfeit and pay $40.

By the Laws of 1879, chapter 21, Governor shall appoint seven physicians, members of the medical society; three of whom shall be residents of New Castle county, and two each of Kent and Sussex counties, who shall constitute the Board of Health of the State. Term of office of one from each county shall expire every two years.

Members of the Board shall receive no salary, but actual expenses when engaged on duties of the Board, shall be allowed. They shall meet at least once in six months.

Said Board shall encourage establishment of local boards of health; shall make inquiries respecting disease, epidemics, etc., and all health officers and boards of health shall communicate with State Board, and State Board shall supply all information to local boards. State Board may require information from all public dispensaries, asylums, prisons and schools, and from all other public institutions, relating to the proper discharge of the duties of the State Board.

They shall have authority to make special inspection of hospitals, prisons, asylums, alms-houses, etc., and report the result to the Legislature at each regular session.

GEORGIA.

§ 1375. According to the Code of the State of Georgia, part 1, title XVI, chapter 2, the corporate authorities of any city or town may establish in them, respectively, or in their vicinity, hospitals or pest-houses, to be subject to such regulations, not contrary to law, as such authorities may make, to prevent the spread of infectious or contagious diseases; but where such authorities may establish such hospitals, etc., out of their own jurisdictional limits, such shall be only on land acquired by such corporations for protection against the spread of diseases within their own limits. In all other cases the Ordinary of the county is vested with the power to establish such hospitals and make such regulations.

§ 1376. *Quarantine.*–The corporate authorities of such town may prescribe the quarantine to be observed by all vessels arriving within the harbor or vicinity of such town, and all legal regulations therefor, extending to all persons, goods and effects arriving in such vessels, and to all persons going on board the same. Any person violating such regulations, after due personal notice, or after five days' public notice, as therein described, shall be guilty of a misdemeanor, and on conviction, shall be liable to a fine not exceeding $500, or such other penalty, not exceeding $100, in lieu of the above, as may be prescribed in any ordinance or by-laws of any corporation having power to pass ordinance or by-law.

§ 1377. Any town may establish a quarantine ground at any place within the harbor, if a seaport town, but not so as to interfere with the rights of private property; and the jurisdiction of the corporation of Savannah shall, in cases of quarantine, extend to all ships, etc., entering any port or inlet from Ossabaw sound to Tagbee, including all inlets, creeks and rivers within those limits.

§ 1378. The health officer or visiting physician may, under the direction of the corporate authorities, cause any vessel arriving therein, or in the vicinity, to be removed to the quarantine ground or other place to be inspected, and any master, seaman, or passenger belonging to a vessel supposed to have infection on board, or from any port where infectious disease prevails, refusing to answer, on oath, inquiries on the subject, made by any health officer, shall be guilty of a misdemeanor, and liable to a fine of $100.

§ 1379. Any person ordered to perform quarantine, escaping, may be arrested under warrant and delivered to the custody of the officers of the quarantine, and any person attempting to escape may be forcibly detained.

§ 1380. The master of any vessel ordered to perform quarantine, deliver his bill of health and manifest, log book and journal; failing to do so, or to repair to quarantine ground after notice, or to part thence, without authority, he shall be guilty of a misdemeanor, and on conviction, shall be fined not less than $200.

§ 1381. Any person coming into town by land from a place infected may be compelled to perform quarantine by health officer under direction of the corporate authorities, and restrained from traveling until discharged. And any person infringing this regulation shall, upon conviction, be fined not exceeding $100.

§ 1382. Pilots are required to make strict inquiry as to the sanitary condition of vessels before entering them, and if it be found that any vessel is infected they shall not enter it, under a penalty of $100 and removal from his office; and any master refusing to answer such inquiries, or giving false information, may be fined a sum not exceeding $500.

§ 1383. No person on board a vessel in which such disease exists or whilst such ship is performing quarantine, shall be permitted to come on shore from such vessel without permission, under the penalty of fine and imprisonment at the discretion of the court; and any person going on board such vessel (except the health officer or visiting physician) and returning without such permission shall be liable to the same penalty.

§ 1384. The Governor of the State may, by proclamation, give such orders and make such regulations to prevent the spread of infectious or contagious diseases as he may deem proper, and any one violating the same may be fined or imprisoned at the discretion of any court of competent jurisdiction.

§ 1385. Violators of quarantine may be indicted in any county in which they may be found, and be fined in not exceeding $500, and imprisoned in the common jail at the discretion of the court.

§ 1386. Any physician or other person who shall conceal a case of small-pox or varioloid, by not giving immediate notice thereof to the proper authority, may be indicted and fined in not exceeding $500, or imprisoned at the discretion of the court.

§ 1387. All fines and forfeitures arising out of the violation of any of these regulations, may be applied in aid of the quarantine and sanitary laws, and toward the support of the poor.

§ 1388. The health officer or the authorized visiting physician of any port shall give a certificate of the performance of quarantine by any vessel to the master thereof under a penalty, for every refusal, of $100, and in case of such refusal, or there being no such health officer or physician, such certificate shall be granted by the constituted authorities of such port or place.

§ 1390. The ordinary of each county, or the corporate authorities of any town or city are authorized to provide a suitable hospital for those suffering from small-pox, and to furnish them with medical or other attention.

§ 1391. Such authorities may provide proper quarantine regulations to prevent the spread of the disease; provided that no person shall be forced to go to such hospital when properly provided and guarded at home. Said court shall pay any expense of such case

§ 1393. The Governor is required to procure the necessary quantity

of genuine vaccine matter, and have the same transmitted to the ordinaries of each county for immediate use.

ILLINOIS.

An Act to create and establish a Board of Health in the State. Approved May 25, 1877; in force July 1, 1877.

The Governor, with the advice and consent of the Senate, shall appoint seven persons, who shall hold office for seven years, to constitute a Board of Health. Provision that the term of one of the seven first appointed shall expire on the 30th day of December of each year.

The State Board of Health shall have charge of all matters relating to quarantine, and shall have power to make rules and regulations, and sanitary investigations for the preservation and improvement of the public health; and it shall be the duty of all police officers, sheriffs, constables, etc., to enforce such rules.

Penaties to be devoted to a special fund for the carrying out the objects of the law.

Board shall appoint a President and Secretary — the latter to receive a salary and expenses as fixed by the Board. No other member of the Board to receive compensation. Board to make an annual report to the Governor, including vital statistics, and such knowledge respecting diseases, and such instruction on the subject of hygiene, as may be thought useful for disseminating among the people.

A sum of $5,000, appropriated for salary of Secretary, expenses of the Board and all other expenses.

By article 14 of chapter 139 of the Revised Statutes, the supervisors, assessor and town-clerk of every town shall constitute a board of health, and on the breaking out of any contagious disease in their town or immediate vicinity, shall have power to make and enforce any rules and regulations tending to check the spreading of such disease, within the limits of such town, as they may think proper; they shall have power to shut up any house or place where any infected persons may be, and cause notices of warning to be put thereon; or remove such person to any pest-house, within the limits of such town, at the expense of the party so moved, if able to pay, or otherwise at the expense of the town. Nothing in this section to apply to any town, or part thereof, lying within the corporate limits of any incorporated city or village.

By chapter 24, article 5, section 75, the city council in cities, and president of the board of trustees in villages, shall have power to declare what shall be a nuisance, and to abate the same, and to impose fines upon those who may create, continue or suffer nuisances to exist.

And by sections 76, 77 and 78, to appoint a board of health, and prescribe its powers and duties; to erect and establish medical dispensaries, and do all acts necessary for the promotion of health, etc.

IOWA.

By the public statute law of Iowa, title 1, chapter 10, section 525, the city council or the trustees of incorporated towns shall have power to establish a board of health, with all powers and duties specified in sections 415-419 of the ninth chapter of this title, viz., respecting nuisances, sources of filth, and causes of sickness. Notice of such regulations to be published in a newspaper published in the city or township, or where there is no newspaper, by posting in five public places therein. The trustees or council may order, in writing, the owner or occupier to remove any nuisance, source of filth, or cause of sickness found on private property within such time as they may deem reasonable, under a penalty not exceeding $25 *per diem* during which he knowingly permits such nuisance, etc., to remain after time prescribed for its removal. If order not complied with, the trustees or council may order the removal at the expense of such owner or occupier.

Power is given to trustees, etc., to employ all such persons as shall be necessary to carry such orders into effect, and to fix their compensation; to employ physicians in case of poverty, and to take such action as they may deem necessary for the preservation of the public health.

Any person willfully violating any of the regulations shall be guilty of a misdemeanor, and shall be liable to a fine not exceeding $100, and imprisonment not exceeding thirty days. The city council is also empowered to establish a city watch, or police, to organize the same under the general supervision of the mayor, etc.

In establishing boards of health, etc., as here provided, the city acts as a *quasi* sovereignty, and is not responsible to individuals for the neglect or non-feasance of its agents or officers in executing the powers so conferred. *Ogg* v. *City of Lansing*, 35—495.

By section 393, title IV, chapter 9, the township trustees are the board of health, and shall have charge of all public cemeteries within the township when the same is not controlled by other trustees or incorporated bodies.

State Board of Health.

By statute, title XI, chapter 8 (18th General Assembly, chapter 151), section 1, the Governor, with the approval of the Executive Council, shall appoint nine persons, one of whom shall be the Attorney-General of the State, one civil engineer and seven physicians, who shall constitute a State Board of Health, to hold office for seven years, the terms of office of the seven physicians first appointed being so arranged that the term of office of one shall expire on the 31st day of January of each year.

§ 2. State Board of Health shall have charge of all matters of quarantine, shall make such regulations as they deem fit and such sanitary investigations as they may deem necessary for the public health.

§ 11. Board shall make a biennial report to the Governor

§ 12. Provides for remuneration of officers.

§ 13. The mayor and aldermen of each incorporated city, the mayor and council of any incorporated town or village, in the State, or the trustees of any township shall have all the powers and perform all the duties of a board of health within the limits of the cities, towns and townships of which they are officers.

§ 14. The physician appointed by the local board shall be the health officer within its jurisdiction.

§ 15. At least once a year such physician and the clerk of the board of health shall report to the State Board of Health their proceedings.

§ 16. Local boards of health shall make such regulations respecting nuisances, sources of filth and cause of sickness within their jurisdiction, and on board any boat in their ports or harbors, as they shall judge necessary for the public safety, and any person violating such shall be liable to a penalty of not less than $25 for every day during which he knowingly violates or disregards the same.

Other classes follow identical with those previously referred to under title I, chapter 10, with the addition of the power to remove the occupants of any condemned building by force and close up the premises, not again to be occupied as a dwelling place without the written sanction of the board.

§ 20. Where board of health is refused admission to any place, etc., a justice may issue his warrant to the sheriff, etc., to enter by force and remove, destroy and prevent such nuisance, source of filth or cause of sickness, under the direction of two or more members of the board of health as are required to accompany him.

§ 21. Care of any infected person coming from abroad, or residing in any city, etc., within the State, or who shall have lately been infected with small-pox or other dangerous sickness, shall be taken by the board of health, who shall remove him to a separate house, if such can be done without damage to his health, and provide proper nurses and supplies at the expense of the county to which he belongs, if himself, his parent or other person liable for his support are unable to discharge the same.

§ 22. If he cannot be removed without damage to his health, the board shall make provision for him in the house in which he may be.

§ 23. Any justice of the peace may, upon application by a local board or any member thereof, issue his warrant for the removal of any person suffering from infectious or contagious disease, or to take possession of condemned houses and lodgings, and to provide nurses and attendants and other necessaries for the care, safety and relief of the sick.

§ 24. Clerk of each board of health shall transmit his annual report to the Secretary of the State Board of Health within two weeks after the November meeting, being required to meet on the first Monday in May and first Monday in November in each year. Such report shall embrace a history of any epidemic which may have prevailed within

his district. The failure of the clerk to forward such report sh be considered a misdemeanor, subject to a fine of not more than $!

§ 25. All laws in conflict with this act are repealed.

By statute, title XXIV, chapter 10, the selling unwholeso food, adulteration of food or liquor, drugs or medicines, neglecti to label poisons, inoculating with small-pox with intent to spre the disease, selling druged liquors, throwing dead animals into a river, well, spring, stream, etc., selling diluted milk, or using pois ous material in making cheese or butter, manufacturing for sale, exposing for sale, oleomargarine without being labeled as such, strictly forbidden under penalty of fine or imprisonment, and the last-defined offense the offender shall be guilty of a misdemean (18th General Assembly, chap. 39.)

Also the manufacturing and selling lard rendered from swi that have died of disease, without having first labeled the ca barrel, etc., containing it accordingly, or, if sold without casks, bar or other receptacles, without having informed the purchaser tl the lard is from hogs who have died of disease, is punishable w fine or imprisonment. (18th General Assembly, chap. 137.)

By the Revised Code of Iowa, title XI, chapter 6 (chap. 1: Laws of 1880), it is enacted that the Governor, with the approval the Executive Council, shall appoint nine persons, one of whom sh be the Attorney-General, one a civil engineer, and seven physicia who shall constitute a board of health, to hold office for seven ye: —*provided* that the terms of office of the seven physicians fi appointed shall be so arranged by lot that the term of one sl expire on the 31st of January of each year — vacancies to be fil up by the Governor, etc., as before. State Board shall have cha of all matters relating to quarantine, shall have authority to m such rules and regulations and such sanitary investigations as tl may deem necessary; and it shall be the duty of all public offic etc., to enforce such rules, etc. They shall elect a Secretary, w shall receive a salary not exceeding $1,200 per annum and ot expenses, but no other member of the Board shall receive a sala Board shall make a biennial report to the Governor, includ information relating to vital statistics, and such knowledge respe ing diseases and instruction on the subject of hygiene as may thought necessary. The sum of $5,000 appropriated for salary Secretary, his contingent expenses and the expenses of the Board

The mayor and aldermen of each incorporated city, the ma and council of any incorporated town or village in the State, or trustees of any township, shall have and exercise all the powers a perform all the duties of a board of health within their respect limits.

Every board of health shall appoint a competent physician to board as health officer. The local boards of health shall report least once a year to the State Board. They shall make such regu tions respecting nuisances, sources of filth, and causes of sickn within their jurisdiction, and on board any boats in their ports

harbors as they shall judge necessary. They may order any owner of any property to remove (at his own expense) any nuisance, sources of filth or cause of sickness, within any reasonable time, and if owner or occupier neglects, he shall forfeit not exceeding $20 for every day during which he knowingly and willfully permits such nuisance, etc., to remain. And the board may cause the nuisance, etc., to be removed, and all expenses incurred shall be paid by the owner, occupier, etc., to be recovered by civil action in the name of the State.

Board to have power to purify dwellings, or may require occupants to quit the premises until such time as the board shall grant permission, in writing, for the re-occupation of premises. Board possesses power to enter any place, building or vessel in their township to prevent or remove any nuisance, source of filth or cause of sickness, and upon complaint of refusal to permit such entry, any justice of the peace of his county may issue his warrant directing the destroyal, removal or prevention by the sheriff or constable, etc., under the personal direction of two or more members of the board.

Board may make such provision as they may think fit by removing any person lately infected with small-pox, or other dangerous sickness, to a separate house, if possible, and by providing nurses and supplies, charged to him or those liable for his support, if able, otherwise at the expense of the county to which such sick person belongs. If such person cannot be moved without damage to his health, like provision shall be made for him in the house in which he may be.

Any justice of the peace, on application by the local board or any member thereof, shall issue his warrant directing, under the direction of the board of health, the removal of any person infected with contagious diseases, or requiring the sheriff, etc., to take possession of condemned houses and lodgings, and to provide nurses and attendants and other necessaries for the care of the sick.

By section 525, chapter 10, title VI, the city council of any city shall have power to establish such a board of health as above specified. And by section 415, chapter 9, title IV, township trustees shall have power to make whatever regulations they deem necessary for the protection of the public health, and respecting nuisances, sources of filth, and causes of sickness within their respective townships—*provided* that their jurisdiction shall not extend to any city or incorporated town situated therein. The same powers are conferred by the subsequent sections as those described above, and any person willfully violating any of the regulations published by the trustees shall be guilty of a misdemeanor and subject, upon conviction, to a fine not exceeding $100 or imprisonment not exceeding thirty days. All expenses incurred by the trustees of a township in the exercise of their powers as a board of health shall be borne by the township.

KENTUCKY.

By the General Statutes of Kentucky, chapter 102, article I, section 1, any person *willfully or designedly* importing the small-

pox or any variolus or infectious matter of the said disease into this State, or causing the same to be done, shall forfeit the sum of $1,000.

By article II, all persons of and above twenty-one years of age who have not been vaccinated, or not successfully, shall within three months after this revision procure their own vaccination or re-vaccination.

And all parents and guardians of minors shall have the same vaccinated, and any parent or guardian of a child born hereafter shall have the same vaccinated within twelve months after its birth, or after it comes under his or her custody.

Persons coming from abroad, if not before vaccinated, shall procure the vaccination of themselves and children within six months after coming into the State.

Practicing physicians shall be appointed in each district to vaccinate the poor — his charges to be paid out of the county levy.

City council of every city, and the board of trustees of every town, are invested with power, and required to make such regulations, with fines and penalties attached, as will secure the vaccination of all the inhabitants of such cities and towns.

All vaccinations with pure vaccine.

Each person, for every failure or refusal to comply with the requirements imposed, shall be fined not less than $5 nor more than $20 for each failure or refusal.

Each justice of the peace, member of a city council or of a board of trustees of a town, and every physician, superintendent of a charitable institution, and keeper of the penitentiary, for every failure or refusal to perform the duties of his office, shall be fined not less than $20 nor more than $50.

By article III, patients in hospitals having small-pox are prohibited all intercourse with others not so infected, and are not to be discharged until thoroughly cleansed, under a penalty of $10.

Persons never having had small-pox, and going into an infected place shall be sent to a safe place, and not discharged except upon certificate of physician.

Any person willfully endeavoring to spread the infection shall be subject to a fine of $500 or imprisonment for six months.

And further, any person, believing himself at the time to be suffering from small-pox, who shall go upon any public highway or street or to any place of public assembly, or who shall go on board any steamboat, railway car, or other public conveyance, and all persons knowingly aiding or assisting any one thus to offend shall be guilty of a misdemeanor, and upon conviction shall be fined not less than $100 nor more than $1,000.

LOUISIANA (INCLUDING NEW ORLEANS).

On arriving at the quarantine grounds below New Orleans and waiting there a day, a ship, no health officer appearing, without any effort to procure one, ascended the river. On nearing the river she was boarded by the boarding physician, who reported to the Board

of Health that she was in a filthy condition, and that there had been several deaths on her by pestilence.

The Board thereupon compelled her to return to quarantine. *Held*, the ship can recover no damages, having assumed the risk of being compelled to return; nor will a court interfere without conclusive proof of the illegal exercise of a discretion confided to sworn officers. *Rudolphe* v. *New Orleans*, 11 A. 242.

By act 8th of February, 1858, No. 4, the United States were granted the use of land at the quarantine station to construct warehouses; and by act of 18th March, 1858, No. 215, the property so granted was exempted from taxation, State or municipal; 1855, Nos. 11, 336, to which the act of 18th March, 1858, No. 269, is supplementary.

The quarantine act, 1855, s. 13, No. 336, defines a certain offense to consist, among other things, in the bringing of a ship from a place proclaimed by the Governor of the State to be infected. *Held*, that it suffices for an information to aver, that the ship came from "*an infected place*" without averring that she came from "*a place proclaimed by the Governor of the State to be infected.*" And yet the only evidence admissible under the statute to prove the infectious character of the ship's port of departure is the Governor's proclamation. *State* v. *Patterson*, 14 A. 46.

Where, in an action to recover fees of inspection under the quarantine act of 15th March, 1855, No. 336, the question presented was, not whether the act be constitutional, but whether the Board of Health was authorized by the statute to charge fees for the inspection of vessels at any other station than that on the river Mississippi, an appeal from the judgment therein rendered was dismissed. *Board of Health* v. *Pooley*, 11 A. 743.

The sanitary commission appointed by the Board of Health can claim no compensation from the city. First, because they acted as agents, and the law presumes, gratuitously. Second, because if they were officers, this was a public trust, without fees. Third, because there was no agreement on the part of the city to pay. *Barton et als.* v. *New Orleans*, 16 A. 317.

The State has the right, in the exercise of its police powers, to pass a law ordering all indigent cases of small-pox to be sent to a designated locality at the expense of the local authorities. *State, ex rel. J. J. Hayes*, v. *City of New Orleans*, 27 A. 522. Act No. 60 of 1872.

MAINE.

By the Revised Statutes of the State of Maine, passed January 25, 1871, title II, chapter 14, sections 34, 35 and 36, a town may choose a board of health of not less than three, nor more than nine persons, who shall have all the powers, and be subject to all the duties, restrictions, liabilities, and penalties of the municipal officers, and health committee or officer.

A town may provide for the inoculation of its inhabitants with the cow-pox, under the direction and control of the health com-

mittee, health officer, or board of health; and raise all necessary sums to defray the expense thereof, or such part as they may think proper.

Towns may establish by-laws for the preservation of health, and for protection against infectious diseases.

By this same chapter, extensive powers are given to municipal officers, and their duties are fully defined in connection with contagious and infectious diseases. To them is granted the power to remove infected persons and goods; or to impress and take up convenient houses, lodgings, nurses, attendants, and other necessaries for the accommodation, safety, and relief of the sick. Compensation to the parties interested to be paid by the town.

By section 14, a town, at its annual meeting, may choose a health committee of not less than three nor more than nine, or one person to be a health officer; who shall remove, at the expense of their town, all filth found in any place therein, which, in their judgment, endangers the lives or health of any inhabitant, and require the owner or occupant, when they think necessary, to remove or discontinue any drain or other source of filth. And, by section 15, if no such committee or officer be chosen, the municipal officers shall be a health committee, and have all their power, and perform all their duties.

By section 20, the municipal officers of a seaport town may make such regulations as they may deem expedient respecting the performance of quarantine by any vessel arriving in their port; and whoever neglects or refuses to obey such regulations shall forfeit not exceeding $500, or be imprisoned not exceeding six months.

By section 21, if any pilots of such port shall neglect to make known the notice received from such municipal officers, respecting the performance of quarantine, to the master of all vessels which they board, or contrary thereto shall pilot any vessel up to said seaport town, he shall forfeit not exceeding $100.

And by section 22, if the master of a vessel fraudulently attempts to elude such directions, after notice, or lands, or suffers to be landed from his vessel, any person or thing, without permission of the municipal officers, he shall be punished as provided by section 20.

By section 24, in every seaport town where there is a health committee or officer, he may perform all the duties, and exercise all the authority of the municipal officers, in requiring the vessels to perform quarantine.

By section 26, a town may establish therein one or more hospitals, for the reception of persons having the small-pox or other disease dangerous to the public health; or the municipal officers may license any building for that purpose, under their control; but no such hospital shall be within one hundred rods of an inhabited dwelling in an adjoining town, without the consent of its municipal officers.

By section 27, if any person inoculates himself, or suffers himself to be inoculated with the small-pox, unless at some lawful hospital, he shall forfeit not exceeding $100.

By section 29, all temporary hospitals shall be subject to the regulations of the municipal officers the same as established hospitals, and where the sick cannot be removed without imminent danger, the house where the sick is shall be deemed a hospital, and subject to hospital regulations.

By section 31, any physician or other person in such hospital violating any lawful regulation in relation thereto, shall forfeit not less than $10, nor more than $100 for each offense.

By section 32, when a householder or physician knows that a person under his care is taken sick of any such disease, and fails to give notice thereof to the municipal officer, he shall forfeit not less than $10, nor more than $30, and all forfeitures shall inure to the use of the town where the offense is committed.

MARYLAND.

By statute of this State (A. D. 1880) chapter 438, a State Board of Health is established consisting of seven members, one of whom shall be a civil engineer and three experienced physicians to be appointed by the Governor, with the advice and consent of the Senate, and a Secretary, who together with the Attorney-General and the Commissioner of Health of the city of Baltimore, the last two being *ex-officio* members, shall constitute the said Board. Those members so appointed by the Governor shall hold office for four years, provided that the term of office of two shall expire on the last day of January in every second year.

The Board shall make sanitary investigations respecting the causes of disease, etc., shall inquire into all nuisances affecting the public health in any county, city or village in the State, and may apply for an injunction to restrain and prevent any such nuisance, no matter by whom or by what authority committed.

They shall organize, as far as possible, in every city, village, and legislative district local boards or advisory committees, to serve without pay, to assist the Board and make quarterly reports to the Board. In the event of an epidemic occurring in any county, city or village, said Board may take all necessary precautions and adopt any sanitary measures which may be consistent with law.

The Secretary shall be an experienced physician. He shall keep a record of all proceedings and shall, when directed by the Governor, make special inspections of public hospitals, asylums, prisons, etc., and advise generally, and collect information respecting vital statistics, and the general hygiene of the State. He shall be constituted the superintendent of vital statistics.

No member of the Board, except the Secretary, shall receive any compensation, but the actual personal expenses when engaged in duties of the Board.

MASSACHUSETTS.

Statute 1832, chapter 150, authorized the selectmen of Charlestown to appoint and locate burying places in that town, to establish the

police of the burying places, to make regulations for funerals, and to appoint proper persons to carry the same into effect. Section 4 of a by-law of Charlestown provided that no person should, without leave first obtained, bring into the town any dead body, or convey through any of the streets, or bury, any dead body so brought into the town, or bury any such body in any part of his own premises or elsewhere. *Held*, that the first part of this section being unauthorized by the statute and void (which was conceded), the whole was therefore void; and also, that it was itself a prohibition, and not a regulation, and unreasonable and void. *Austin* v. *Murray*, 16 Pick. 121 (1834).

The by-laws and ordinances of the city of Boston concerning burying grounds are regulations relating to health within statute 1849, chap. 211, § 7. *Commonwealth* v. *Fahey*, 5 Cush. 408 (1850).

The General Statutes of Massachusetts, A. D. 1860, relating to the preservation of the public health (chap. 26), and to cemeteries and burials (chap. 28) contain the following provisions:

§ 1. Towns, respecting which no provision is made by special law, may choose a board of health, or health officer. If no board or officer is chosen, the selectmen shall be the board of health.

§ 2. Except where otherwise provided the city council of a city may appoint a board of health. In default of the appointment of a board of health with full powers, the city council shall have the powers and perform the duties prescribed to boards of health in towns.

§ 3. Every board may appoint a physician to the board, who shall hold his office during pleasure.

§ 4. The board shall establish the salary or other compensation of such physician, and shall regulate all fees and charges of persons employed by it.

§ 5. The board shall deal with nuisances, filth and causes of sickness, within its own town or on board of vessels within its harbor with a view to the prevention or spread of contagion or infection. Penalty for violating any of its regulations, not exceeding $100.

§ 8. Powers are given for examining all nuisances, etc., and ordering their removal within twenty-four hours or other reasonable time, and if the owner or occupant of private property on which such nuisances, etc., are found neglects to remove the same, he shall forfeit not exceeding $20, for every day during which he knowingly permits such nuisance, etc., to remain.

§ 10. If owner or occupant fails to comply, the board may cause the nuisance, etc., to be removed at the expense of such owner, occupant, or other person who caused or permitted the same, if he has had actual notice from the board of its existence.

§ 11. Board may notify the occupants, or any of them, of any cellar, room, tenement or building in its town, to quit and the premises to be put into a proper condition as to cleanliness, and if the persons so notified neglect or refuse to comply with the terms of such notice, the board may cause the premises to be cleansed at expense of the owners, and remove the occupants forcibly, and close

up the premises. If the owner knowingly afterward occupies or permits the same to be occupied without the consent of the board in writing, he shall forfeit not less than $10 nor more than $50.

§ 12. When a person is convicted upon indictment of a common nuisance, the court may order it to be removed or destroyed at the expense of defendant, under direction of board of health.

§ 14. If the entry of board into any land, building, or vessel within its town be opposed, two justices of the peace of the county may issue a warrant directing the sheriff to repair to the place and destroy, remove or prevent the nuisance complained of.

§§ 15, 16. Permits for removal of any nuisance, infected article, or sick person, and a provision for the removal of such person to a separate house, etc., and for nurses and other assistance and necessaries may be made by the board, and charged upon sick person, his parents or master, if able; otherwise at the charge of the town, or if he be not an inhabitant of any town, at the charge of the Commonwealth.

§ 17. If infected person cannot be removed without danger to his health, provision to be made for him in the house in which he is.

§ 18. Travelers may be intercepted and examined by persons appointed for that purpose by any board of health of a town near to or bordering on either of the neighboring States, if suspected of bringing from infected places of other States any infection dangerous to the public health; and if need be, they may be restrained from traveling until licensed thereto by the board of health of the town to which they may come. A traveler from such infected place who shall without such license travel within this State (except to return whence he came, by the most direct way) after caution shall forfeit a sum not exceeding $100.

§ 19. Two justices of the peace may, if need be, issue a warrant directed to the sheriff, etc., or any constable requiring them to remove any infected person, or to impress and take up convenient houses, lodging, nurses, attendants and other necessaries, for the accommodation and relief of the sick.

§ 20. Any baggage, clothing or goods suspected of being infected may be secured under justice's warrant, and persons may be prevented from removing or coming near the same until due inquiry is made into the circumstances.

§ 21. Under the same warrant officers may be required, under direction of the board, to impress and take up convenient houses or stores for the safe-keeping of such articles, and the board may direct their detention, until in its opinion they are freed from infection.

§ 22. Officers in execution of the warrant may break open any house, shop or other place mentioned in warrant where such articles are. And whoever neglects or refuses to assist them shall forfeit a sum not exceeding $10.

§§ 23, 24. The board may determine the prices and rates to be charged for securing, transporting and purifying such articles, which charges shall be paid by the owners. The parties interested shall,

however, be entitled to a just compensation therefor, to be paid by the town so impressing, etc.

§ 25. If any prisoner or inmate of work-house has a disease in the opinion of the physician of the board dangerous to health of other prisoners or of the town, the board shall direct the removal of such person to a hospital or other place of safety, there to be provided for and kept in security until recovery, to be then returned to prison or other place of confinement.

Vaccination.

§ 27. Parents and guardians shall cause their children and wards to be vaccinated before they are two years of age, and re-vaccinated whenever the selectmen or mayor and aldermen shall after five years require it.

§ 28. These authorities shall enforce the vaccination of all the inhabitants, and, whenever they think the public health requires it, the re-vaccination of all the inhabitants who do not satisfy them that they have been successfully vaccinated or re-vaccinated within five years. All persons over twenty-one years of age, not under guardianship, who neglect to comply with such requirement, shall forfeit $5.

§ 29. Towns shall furnish means of vaccination to such as are unable to pay for the same.

§ 30. Incorporated manufacturing companies, superintendents of alms-houses, and other charitable institutions, etc., keepers of prisons, etc., or officers of all other institutions supported or aided by the State, shall at the expense of their respective establishments cause all inmates thereof to be vaccinated immediately upon their entrance thereto, unless they produce sufficient satisfactory evidence of previous sucessful vaccination within five years.

Quarantine.

§§ 34, 35, 36. The board of health in each seaport town may from time to time establish the quarantine to be performed by vessels arising within its harbor, and may make such regulations as it deems necessary, extending to all persons, goods and effects arriving in such vessels, and to all persons visiting or going aboard such vessels, and whoever violates such regulations, after notice shall forfeit a sum not less than $5 nor more than $500.

§§ 37, 38. The board in each seaport town may cause any vessel arriving in such port, when such vessel or its cargo is, in its opinion foul or infected, to be removed to the quarantine ground and thoroughly purified at the expense of the owners, consignees or persons in possession, and may cause all persons arriving at or going on board to be removed to a hospital under care of the board. any master, seaman or passenger belonging to any vessel on board of which any infection is or has been, or is suspected to have been or which has come from any port where any infectious distemper

prevails, refuses to answer on oath to inquiries made of him relating to such infection or distemper by the board of health of the town to which such vessel may come, such master, seaman or passenger shall forfeit a sum not exceeding $200, and if not able to pay, shall suffer six months' imprisonment.

§ 39. All expenses incurred on account of any person, vessel or goods under quarantine regulations shall be paid by such person or the owner of such vessel or goods respectively.

Hospitals and Dangerous Diseases.

§ 40. Any town may establish one or more hospitals for diseases dangerous to the public health.

§§ 41, 42. Such hospitals shall be subject to the regulations of the board, or of a committee of the town, and not within one hundred rods of an inhabited dwelling-house in an adjoining town, without the consent of such town.

§ 43. The physician, nurses, attendants, the sick therein, and all persons approaching or coming within the limits of the same, and all furniture and other articles used there shall be subject to the regulations of the board of health, or the committee appointed for that purpose.

§ 44. Board may cause any person suffering from a disease dangerous to the public health, to be removed to any such hospital, whether temporary or permanent, and if such person cannot be removed without danger, the house or place in which he remains shall be considered as a hospital, and subject to the regulations of the board of health, or the committee as aforesaid.

§ 45. The selectmen and board of health shall give public notice of infected places in the town to travelers, by displaying red flags at proper distances, and by all other means in their power.

§ 46. If any person, in any of the hospitals or places of reception, violates any of the lawful regulations, he shall for each offense forfeit not less than $10 nor more than $100.

§ 47. If a householder knowingly neglects or refuses to give notice to the authorities, as aforesaid, that a person within his family is taken sick of small-pox, or any other dangerous disease, he shall forfeit a sum of not less than $100.

§ 48. And a physician, neglecting to give notice of any patient of his suffering from small-pox, etc., shall forfeit for each offense a sum of not less than $50 nor more than $100.

§ 49. Expenses incurred by a *town*, in the removal of nuisances or preservation of the public health, and which are recoverable by law, may be sued for and recoverable in an action of contract.

§ 50. Fines and forfeitures, incurred under by-laws and regulations of a *town* relating to health, shall inure to the use of such town.

§ 51. Provisions of sections 16, 17, 44, 45 and 46 shall not apply to small-pox.

Offensive Trades.

§ 52. The board shall, from time to time, assign certain places for the exercising of any trade or employment which is a nuisance or dangerous to the public health, or hurtful to the inhabitants, and may prohibit the exercise of it elsewhere within the limits of the town.

§ 53. Supreme Court may, on complaint, revoke such assignment.

§ 55. Board empowered to serve orders, under section 52, of prohibition, etc., upon occupant or person in charge of premises. If party so served refuses or neglects for twenty-four hours after service to obey the same, board shall take all necessary measures to prevent the exercise of such trade, etc., and persons so refusing, etc., shall forfeit not less than $50 nor more than $100.

§§ 56, 57. Appeal allowed within three days, but such trade, etc., shall not be exercised during the pendency of the appeal.

§ 58. Provisions made as to costs.

CHAPTER 28.

Of Cemeteries and Burials.

§ 6. Boards of health may make all regulations which they deem necessary concerning burial grounds and interments within their respective limits; may prohibit the use of tombs by undertakers (as places of deposit for bodies committed to them for burial), for the purpose of speculation, and may establish penalties not exceeding $100, for any breach of such regulations.

§ 7. Legal notice of such regulations shall be publicly given.

§ 8. Before a tomb, burial ground or cemetery is closed by order of the board of health, for a longer time than one month, all persons interested shall have an opportunity to be heard, and personal notice of the time and place of hearing shall be given as therein described.

§ 9. Appeal allowed therefrom to Superior Court at any time within six months from the date of the order. But order of the board shall remain in force until decision had on the appeal.

§ 10. If order is sustained, the appellant shall be liable for double costs in favor of the board of health for the use of the town or city.

A. D. 1871—CHAPTER 167. (Supplement to General Statutes.)

An Act concerning Slaughter-houses and Noxious and Offensive Trades.

§ 2. Whenever in any city or town, containing more than four thousand inhabitants, the State Board of Health order any person or persons or corporation carrying on the business of slaughtering cattle, sheep or other animals, or for melting or rendering establishments, or for other noxious or offensive trades in any building or premises to desist and cease from carrying on such trades, etc., and any such persons continue, notwithstanding such order, to carry on such trades

or occupations in such forbidden building or premises, they shall forfeit not exceeding $200 for every month they continue so to occupy the premises for that purpose after being ordered to desist, and in like proportion for a shorter time; *provided* that, on application to the Board to exercise such powers, a time and place for hearing the parties be assigned by said Board, and due notice given thereof, and the aforesaid order only be issued after such notice and hearing.

§ 3. The Supreme Judicial Court, or any one of the justices thereof, in term time or vacation, shall have power to enforce the orders of the State Board of Health issued under section 2 of this act.

The State Board of Health, referred to as above, is authorized to be established under act (A. D. 1869), chapter 420, and is as follows:

SECTION 1. The Governor, with the advice and consent of the Council, shall appoint seven persons, who shall constitute the Board of Health and Vital Statistics. The persons so appointed to hold their offices for seven years; *provided* that the terms of office of the seven first shall be so arranged that the term of one shall expire each year, and all vacancies, in whatever way occurring, be filled by the Governor with the advice, etc., as aforesaid.

§ 2. The Board shall take cognizance of the interests of health and life among the citizens. They shall in the month of January in every year make report to the Legislature of their doings, investigations and discoveries during the preceding year, with such suggestions as to legislative action as they may deem necessary.

§ 3. No member, except the Secretary, shall receive any compensation, but the actual personal expenses of any member while engaged in the duties of the Board shall be paid.

§ 4. The Board shall examine and report upon the effect of the [illegible] of intoxicating liquors upon the industry, etc., health and lives [illegible] the citizens. Also what additional legislation, if any, is necessary.

§ 5. The Board shall elect a Secretary, who, when elected, shall be [illegible] member of the Board.

ACT 1870, chapter 365. The State Board of Health may order [illegible] person at any time, engaged in the business of slaughtering, [illegible]in six miles of Faneuil Hall Market, Boston, and not upon any [illegible]d in the harbor, to slaughter his cattle, sheep, or other animals, [illegible] premises of the corporation of the "Butchers' Slaughtering and [illegible]ing Association," located in the town of Brighton, *provided* [illegible] thirty days' notice shall be given to such person by the Board, [illegible] if after such order said person shall continue to conduct his [illegible]ness in a way, in the judgment of the Board, injurious to the [illegible]c health, Supreme Court or any justice thereof, sitting in equity have power to enforce any such order by injunction. Any [illegible]n aggrieved by order of the Board shall have a right to [illegible]l in the same manner as such right is given by chapter 26 of [illegible]eneral Statutes, to a person aggrieved by an order of a town [illegible] of health, prohibiting the carrying on of offensive trades.

CHAPTER 167. *An Act concerning Slaughter-houses, and Noxious and Offensive Trades.* See § 2.

Cases Citea.

1. The Legislature can constitutionally make the action of its delegate, in revoking a license, final, and not subject to be reviewed by a jury. Although the Mass. Stat. 1871, chap. 167, does not expressly give to a person aggrieved by an order of the State Board of Health, under section 2, adjudging his business to be a nuisance, a right of appeal therefrom to a jury, yet he has such right. *Sawyer* v. *State Board of Health*, 125 Mass. 182.

2. On such appeal from an order, prohibiting the business of "slaughtering and rendering," on certain premises, the jury may permit the business of "slaughtering" under restrictions, that the cellar be concreted in concave form, that no swine be kept within, and that all offensive matter be removed before a certain hour in water-tight boxes, and that the premises be kept in a condition of cleanliness acceptable to the local board of health; Mass. Gen. Stat., chap. 26, § 5, requiring the board to make such regulations as it deems necessary for the public health. Ib.

MICHIGAN.

When the board of health of a township necessarily incurs expenses in providing for the protection of its inhabitants against a sickness dangerous to the public health, by the removal of persons infected, to a building provided for them, such expenses are a charge against the county, which it is the duty of the board of supervisors to allow. *People* v. *Supervisors of Macomb*, 3 Mich. 475.

Boards of health to suppress nuisances, with full powers of enforcing ordinances for registration and mortuary statistics, provided that the same are not inconsistent with the rules and regulations of the State Board of Health and the laws of the State.

MINNESOTA.

By chapter 10, General Statutes, section 51 *et seq.*, the town supervisors constituted under this act (the Township Organization Act) shall constitute a board of health, and shall have and exercise all the powers necessary for the preservation of the public health.

Such board may examine into all nuisances, sources of filth and causes of sickness, and make such regulations as they may think necessary, and every person violating such rules, when duly published, shall be deemed guilty of a misdemeanor, and punished by a fine not exceeding $100, or by imprisonment in the county jail not exceeding three months.

Board shall order the owner or occupant of any private property on which any nuisance, source of filth or cause of sickness is found, to remove same within twenty-four hours, and if he neglects he shall forfeit not exceeding $50, to be recovered for the use of the town,

and the board of health may then remove the same at his expense, or at that of such other person as has permitted the same.

If board are refused admission to any building or vessel in their town for the purpose of examining and destroying, removing or preventing, any nuisance, source of filth or cause of sickness, a justice of the peace may, upon application, issue a warrant directing constables to accompany two or more members of the board, and, under their direction, to remove, destroy, etc. Infected person may be removed by direction of the board to a separate house with all proper appliances, at his charge or that of his guardians, if able, otherwise at the public expense.

Board shall provide hospital for sick and infected in case of epidemic. and may cause any sick or infected person to be removed there, if his health will permit it, otherwise the place where he remains shall be considered a hospital under regulations of the board.

By chapter 101, section 4, whoever inoculates himself or any other person, or suffers himself to be inoculated with the small-pox, with intent to cause the prevalence or spread of this infection, shall be imprisoned in the county jail not more than one year or by fine not exceeding $500.

MISSISSIPPI.

By chapter 32 (A. D. 1880), section 12, a chief health officer shall be appointed in each county in the State by the Governor, on the nomination of the State Board of Health, and who shall be a physician of sanitary attainments, whose term of office shall be for two years, subject to removal by the Governor, on the recommendation of the State Board of Health.

And by section 11, all incorporated towns shall have power to pass laws, and to create boards of health, to suppress nuisances, with full powers of enforcing ordinances for registration and mortuary statistics, *provided* that the same are not inconsistent with the rules and regulations of the State Board of Health and the ' ws of the State.

MISSOURI.

By article II of the Revised Statutes, chapter 89, sections 4586–9, 4590–3 (A. D. 1879), a health department shall be erected in all cities of the first class, which shall be managed, directed and controlled as provided by this article, and by ordinances of such city, by a board of health and by a health commissioner, who shall be appointed by the mayor and council. His tenure of office shall be four years, removable by the mayor.

There shall also be created a board of health, which shall consist of the mayor, the presiding officer of the council, a commissioner of police, and two regular practicing physicians. The health commissioner shall be an officer of the same board. Board shall meet twice in each week during the year. Three members shall constitute a quorum, and it shall have power to adopt rules and regulations for its government.

Health commissioner shall have general supervision over the public health, and he is empowered to make such rules and regulations, with the approval of the board, as will tend to preserve the public health, to enter into, or require any employee or police officer to enter upon and examine, in the day-time, all buildings, lots, and places of every description within the city, and report the condition thereof so far as the public health is concerned; to abate nuisances — but all condemnations must first be approved by the board of health, whose action shall be final. He shall obey all lawful orders of the board of health and shall annually report to the mayor.

Police officers are required, through their chief, to report to the health commissioner any nuisance or accumulated filth existing in the city.

The superintendents of the city hospital, the female hospital, the insane asylum, and of quarantine, when necessary, shall be under the general supervision of the health commissioner, and shall be appointed by the mayor, with the approval of the board of health.

Health commissioner shall have power to notify to owners of the existence of any nuisance or filth on their premises, after officially so declared of record by the board of health, to abate or remove the same. A fine not exceeding $500 may be imposed for disobedience to such notification, and the nuisance shall be abated and special tax bills rendered against the property, but the owners shall first have an opportunity to be heard before the health commissioner and the board of health, if they so desire.

Whenever the mayor shall have knowledge that any malignant, infectious or contagious disease or epidemic is prevalent in the city, or will probably become so, he may make proclamation to that effect, and after that the health commissioner, with the approval of the board of health, may take all steps necessary to suppress or mitigate such disease, and may employ officers, agents, nurses, servants, establish temporary hospitals, provide all things necessary, with the advice and counsel of the board of health, provided that the amount expended shall not exceed the appropriation for the health department.

NEW JERSEY.

By an act of the 104th Legislature of the State of New Jersey and thirty-sixth under the new Constitution, chapter 187, session of 1880, it is enacted that in any county of the State where there is by law a board of health and vital statistics, such shall be the only legally constituted body in said county, or in any municipality or town in said county, having power to make ordinances in relation to the public health or vital statistics.

County board may appoint health inspector, a graduated physician or chemist, who shall receive not over $1,500 a year as salary, and who shall be subject to the said board. Board shall also appoint a counselor at law at a salary of $1,000 a year, his office being tenable for two years, who shall bring and defend all suits and be the legal adviser of said board. Said board to have power to pass, alter,

amend or repeal ordinances in relation to public health and vital statistics in said county, to provide against

1. Adulteration of foods and drinks, or any kind of meat or vegetable not fit for human food, sold, exposed for sale, or brought into county for sale.

2. To declare what shall be nuisances, in lots, streets, docks, wharves, vessels, piers, and all public or private places.

3. To provent the spread of dangerous, epidemic, or contagious diseases, and to declare when same has become epidemic.

4. To regulate the keeping of animals and the slaughter of the same.

5. To regulate, control or prohibit noxious or offensive trades, attended by noisome and injurious odors and otherwise injurious to property.

6. To regulate, license and control all night scavengers and their occupations.

7. To regulate, control and prohibit the accumulating of manure, compost, and all decaying or vegetable substances.

8. To prohibit and remove all or any nuisance, or offensive matter in any public highway, etc., or other place, public or private, at the expense of owner.

11. To regulate the keeping of a registry of the vital statistics of said county.

13. To secure sanitary condition of tenement-houses, prisons and all public buildings.

14. To regulate the cleaning of sewers, and the dumping of garbage, and the filling of sunken lots or marsh land.

15. To provide for filling in of sunken lots, the repositaries of stagnant water in the built-up portions of city.

Board of health may prescribe a penalty for violation of their ordinances, when the same has been duly published, not to exceed $100 and not less than $10. District Courts, justices of the peace, and recorders may issue process on oath, to hear and determine such cases. On failure to pay the judgment against him, together with costs, unless an appeal is granted, defendant to be committed to county jail for not exceeding ninety days, and if twice convicted in the space of six months, then in addition to the penalty, defendant to be imprisoned in county jail or work-house, with or without hard labor, for one day for each dollar of the penalty; all police officers, constables and health inspectors may arrest without warrant any person in their presence violating any of the ordinances of said board.

By chapter 220 of same act and session, it is enacted that the State Board of Health shall have power to determine whether pleuro-pneumonia, rinderpest, or any other contagious or infectious disease exist among animals, and that the sum of $500 be appropriated to defray necessary expenses of such examinations.

Owners of animals required to notify State Board of the existence of such disease; whereupon said animals shall be quarantined by said Board and remedial measures adopted.

Board, in its discretion, may order said animals to be slaughtered

and their remains buried not less than four feet under ground, and the places where they were kept to be cleansed and disinfected.

Two-thirds of the appraised value of such animals shall, in such cases, be paid to the owner.

Any person failing to notify said Board of the existence of such diseases shall be deemed guilty of a misdemeanor and be liable to be fined not more than $200, or be imprisoned not exceeding one year; both at discretion of the court; and further, any person knowingly buying, selling, or causing to be bought or sold, any animal affected as aforesaid, shall be deemed guilty of a misdemeanor, and be liable to a fine not exceeding $200, or imprisonment not exceeding one year; both at discretion of the court.

The following cases have been decided under the statutes of the State of New Jersey, defining the nature, character and powers of a board of health—the rights of citizens, notwithstanding—what constitutes a nuisance, and the mode to be adopted for its abatement, after being duly adjudged a nuisance, or by the contravention of some ordinance, defining and prescribing the mode in which any pursuit or calling may be used without incurring its condemnation as a nuisance, and inimical to public health.

The functions of a board of health are of an executive and advisory, but not of a legislative or judicial character. A resolution passed by said board declairing plaintiff's tannery to be a nuisance, is void. *State-Marshall* v. *Trenton*, 7 Vr. 283.

Nor can a city recover the expense of filling up low lands of a defendant; by the adoption of such a resolution by a board of health, and subsequent notification to the owner (the defendant) to do so. *Hutton* v. *Camden* (Nov., 1876), Court of Errors.

The board of health of the city of Newark, in the legitimate exercise of its powers, cannot absolutely prohibit the carrying on of a lawful business, not necessarily a nuisance, but which may be conducted without injury or danger to the public health, and without public inconvenience. They will be confined, in their interference with the lawful business of any individual, to such interruptions as may be reasonably necessary to enable them to abate any nuisance he may create in conducting it. *Weil* v. *Ruord*, 9 C. E. Gr. 169.

A tannery is not *per se* a nuisance, and cannot be abated by street commissioner or board of health, until adjudged to be so employed as to be inimical to public health or safety, or until the owners contravene some ordinance prescribing the mode in which it or any other calling shall be used, and thereby make them nuisances. *State-Marshall* v. *Cadwalader*, 7 Vr. 283.

STATE BOARD OF HEALTH OF NEW YORK.

CHAPTER 324 (April 10, 1850), entitled *An Act for the Preservation of the Public Health.*

SECTION 1. Local boards of health required to be appointed in cities and incorporated villages once in every year, where as yet no

board of health existed, consisting of not less than two nor more than seven persons, and a competent physician to be the health officer.

§ 2. The supervisor and justices of the peace, or the major part of them, of each town in the State, shall be a board of health for each year, whenever, in the opinion of the majority of them, the public good requires it; and they appoint a physician to be officer of health.

§ 3. The several boards of health now organized in any city or village, except in the metropolitan district, and the several boards of health constituted under this act, shall elect a president and secretary of such board, and it shall be their duty (1) to meet in their respective cities, villages and towns and fix and determine the period of quarantine to which vessels, vehicles or persons arriving in such city, etc., shall be subject, with power subsequently to reduce the period if they deem it right. (2) To prescribe the duties of the officer of health and fix the amount of his compensasion. (3) To make orders and regulations concerning the place and mode of quarantine, the examination and purification of vessels and other craft not under quarantine; the treatment of vessels, articles or persons thereof; regulation of intercourse with infected places; the apprehension, separation and treatment of emigrants, etc., who shall have been exposed to any contagious or infectious disease; suppression and removal of nuisances, and all such other orders and regulations as they may deem necessary. (4) To regulate and prohibit and prevent all intercourse with houses and places and their occupants, in which there shall be any one suffering from infectious or contagious disease. (5) To procure suitable places for the reception of persons sick with the Asiatic or malignant cholera, or any other malignant infectious or contagious disease, and to procure for them, if necessary, proper medical treatment. (6) To publish, from time to time, all orders and regulations of general obligation, and to make, without publication, any orders in special and individual cases, concerning the suppression and removal of nuisances and other matters detrimental to the public health, and to serve copies thereof upon occupants of premises designated as nuisances. (7) To issue warrants to any constable within their jurisdiction to apprehend and remove such persons as cannot otherwise be subjected to the regulations; and to issue warrants to the sheriffs of their respective counties to aid; all of which officers shall possess power to execute the same. And, as added by section 1, chapter 559, Laws of 1870, to impose penalties for the violation of, or non-compliance with the orders, etc., and to maintain actions for their recovery not exceeding $100, in any one case, or to restrain by injunction or otherwise enforce, as may be.

§ 4. (As amended by chap. 790, Laws of 1867.) Every person willfully violating or refusing to obey any such order or regulation shall be deemed guilty of a misdemeanor, and on conviction shall be subject to fine or imprisonment, or both, such fine not to exceed $1,000, nor such imprisonment two years. And in case of of noncompliance with any order, etc., so served, as provided in subdivision

6 of section 3 of said act as amended, the board may lawfully enter upon any premises and remove the nuisance or other matter mentioned in the order, and any other nuisance, etc., found there existing; expense shall be a charge upon the occupant or occupants and may be sued for in the name of the board; and the judgment obtained shall be, if unsatisfied, a lien upon the premises, having preference over all other liens or incumbrances whatsoever, and the said board may cause the premises to be sold for satisfaction of such lien and the expenses of the sale at public auction of the premises, all proper notices of such sale having been duly given and published. (Then follows the definition of the rights and security of the purchaser of the said lien or judgment.)

§ 5. (As amended by chap. 761, Laws of 1868.) All expenses incurred by the several boards shall be a charge only on their respective cities, villages and towns.

§ 6. Persons supported at county poor-house, liable to be infected by any pestilence or infectious disease existing in such poor-house or in its vicinity, may, upon the physician of such county poor-house certifying that the health of such inmates is thereby endangered, be removed by the superintendent to such suitable place as may be designated by the board of health of the city, etc., within which such poor-house is situate, and shall be there maintained at the expense of the county and provided with all necessary medical attendance until returned or otherwise discharged.

§ 8. The city and county of New York are exempted from the provisions of this act. See *Rogers* v. *Barker*, 31 Barb. 447, limiting the power for the suppression of nuisances to the regulation of nuisances *per se*. Cannot abate a mill-dam. *Ib.* But see chap. 559, Laws of 1870, subd. 9 of section 3 of this act. As to right of trial by jury, see *Board of Health* v. *Heister*, 37 N. Y. 661.

"*An Act relative to the Public Health of the city of New York*" (1850, *chap.* 275).

SECTION 1. The legislative powers hitherto vested in the board of health, otherwise than as herein modified or altered, shall be vested in the mayor and common council of the city of New York.

§ 2. Mayor and common council shall be known as the board of health, of which ten members shall constitute a quorum.

§ 4. The president of the board of aldermen, the president of the board of assistant aldermen, health officer, the resident physician, the health commissioner and city inspector shall be the commissioners of health.

§ 5. The mayor and the commissioners shall render their advice to the board of health, and to the city inspector, in regard to all sanitary matters.

§§ 6, 7. Health officer though required to perform all the duties specified, and such other duties as the board of health or the mayor and commissioners shall lawfully require, may appoint a deputy, for whose conduct he shall be responsible.

§§ 8, 9. The resident physician shall visit all sick persons reported to the board, or to the mayor and commissioner, and shall perform such other professional duties as the board of health shall enjoin, and the health commissioner, under direction of the board of health, shall assist such physician.

§ 15. Board of health may appoint as many visiting, hospital and consulting physicians as they may deem necessary.

§ 16. The mayor, with the advice and consent of the board of aldermen, may appoint an inspector of vessels, who shall, under the direction of the mayor and the commissioners of health, or of the board of health, perform the duties required of him and receive the fees, as prescribed by the act.

§ 17. Such inspector, after having performed any service required of him, shall make an immediate report to the board of health, or to the mayor and the commissioners.

An Act to establish a State Board of Health.

PASSED May 18, 1880; three-fifths being present.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. Within twenty days after the passage of this act, the Governor, by and with the advice and consent of the Senate, shall appoint three State Commissioners of Health, two to be graduates of legally constituted medical colleges, of not less than seven years' practice in their profession. Said Commissioners, together with the Attorney-General, the Superintendent of the State Survey, and the Health Officer of the port of New York, who shall be *ex-officio* members of the State Board of Health; and three other persons to be appointed by the Governor, one of whom shall be a commissioner of health of the board of health of the city of New York, and the others shall be members or commissioners of health of regularly constituted and organized boards of health of cities of the State, shall constitute the Board of Health of the State of New York. Nothing in chapter 335 of the Laws of 1873 of the State of New York, or in laws amending the same, or in laws constituting boards of health in the various cities in the State, shall be construed to prevent the appointment of said commissioners of boards of health of cities; also members of Board of Health of State of New York, and no appointment to, or acceptance of an office thereof under this law shall be held to vacate any office previously held in any board of health of any city in this State.

§ 2. Said three State Commissioners shall hold office for three years, and whenever a vacancy occurs, the place shall be filled as in other cases provided by law, and the other Commissioners shall, from time to time, be designated by the Governor, as occasion may require, or as their places may be vacated in the Board by the expiration of their several terms of office.

§ 3. Board shall *meet, at least,* once in every three months, first

meeting being held in city of Albany within two weeks after the appointment of members of first Board, and each annual meeting within two weeks after the 1st of May, each year after the first. They shall elect annually a person of skill and experience in public health duties, and sanitary science, to be their Secretary and Executive officer, having all the powers of a member of the Board, with the exception of voting on matters relating to his own office and duties. He shall hold office for three years, removable for cause, after full hearing, by a majority of the Board.

§ 4. Board may appoint committees, to whom it shall delegate authority and power.

§ 5. Secretary shall receive an annual salary of $3,000 and necessary expenses.

§ 6. Board shall take cognizance of the interests of health and life, and shall make all proper investigations in respect to the public health. And all health officers and boards of health in the State shall communicate to the State all sanitary information, whether in reports or otherwise, as may be useful.

§ 7. State Board of Health shall regulate the transfer permits issued by local boards of health for the transportation of dead bodies which are to be buried beyond the limits of the counties where the death occurs. Coupons are required to be attached to such permits to be preserved by the person to whom such dead bodies are delivered for transportation.

§ 8. Governor may require the Board to examine into nuisances, and upon their report may order their abatement. Any violation of such order shall be held and punished as a misdemeanor.

§§ 9, 10. Local board may select any one of its officers as its representative on the examination of any nuisance. Persons may be engaged to render sanitary services, etc., and persons having charge of public structures shall permit and facilitate such examination. No more than $5,000 in any one year shall be expended for such special sanitary service.

§ 11. Annual report on 1st December in each year shall be made to the Governor of the State upon the vital statistics and sanitary condition of the State. Such report shall contain a detailed statement of the expenditure, but the total expenditure for any one year shall not exceed $15,000.

§ 13. Act to take effect immediately.

Cases Cited.

1. *Powers of board of health.*— Powers conferred on a board of health for such an important object as the preservation of the public health, should receive a liberal construction for the advancement of the ends for which they were bestowed. 1869, *Gregory* v. *New York*, 40 N. Y. 273.

2. The board of health of the city of New York have power to act upon a particular thing dangerous to public health, and cause it to be abated; but they have not power to assume, in advance, that

all the sinks and privies in that city are or will become nuisances or dangerous to the public health, and bind the city by a contract for the removal of their contents. *Ib.*

Although the power to "regulate" includes the power to prohibit a slaughter-house in a city, yet a power to "regulate and license" a business or trade confers no powers to tax it. The rules and regulations which a corporation may make in respect to business or trade, under its police power, are such only as have relation to the public health, morals, and order of the community. *Mühelbrink* v. *Long Branch Corners*, New Jersey Supreme Court, June, 1880.

Thos. J. Reed, Plaintiff in Error, v. *The People, Defendants in Error.*

It is only when a regulation of the board has been made and published that a person can be convicted, under fourth section of the act, of a misdemeanor, for its violation. An order of the board of health, made *ex parte* and adjudging certain premises to be a common nuisance, is not such a regulation as is contemplated by fourth section, and a failure to comply with such order does not subject the person offending to punishment for a misdemeanor, under section 4. These regulations are to be in the nature of laws prescribed and published in contradistinction to a judgment, sentence, decree or order, and contemplates the exercise of a power in its character, legislative rather than judicial. Parker's Crim. Rep., vol. 1, p. 481.

The People, ex rel. Savage, v. *The Board of Health of the City of New York.*

The board of health has no power to adopt a resolution declaring any trade or occupation carried on within the limits of the city, to be a nuisance without notice to the party conducting the same, and giving him an opportunity to be heard in his defense. 33 Barb. 344.

John Underwood, Appellant, v. *John Green, Respondent.*

To justify a conversion of plaintiff's property, under a city ordinance directing "all dead animals" * * * "to be forthwith removed and disposed of by removal beyond the limits of the city, or otherwise, so as most effectually to secure the public health," it must be shown that the dead animals removed were, or would become, in some way dangerous or deleterious to public health. 42 N. Y. Rep. 140.

On May 12, 1884, an act was passed by the State Legislature authorizing the board of health of the city of New York to designate and set apart on the water front on the east side of New York, one or more places of sufficient size for the temporary deposit of stable manure, north of Forty-second street. Act to take effect immediately. *107th Session, chap. 278.*

Also, on May 31, 1884, an act was passed empowering the Governor in the exercise of his judgment, for the more speedy and economical suppression, or for preventing the spread of any infectious or contagious disease of domestic animals, to cause to be slaughtered and to be disposed of afterward any animal which, by exposure to infection or contagion, may be considered after examination to be liable to contract or to communicate the disease sought to be suppressed. Provisions for ascertaining and awarding the value of animals slaughtered are added. *107th Session, chap.* 418.

PENNSYLVANIA.

1. To obtain a valid lien for the removal of a nuisance the Board of Health must strictly pursue the provisions of the act of 1818; there must be a complaint of two householders, and a warrant from a justice. *Baugh* v. *Sheriff*, 7 Phila. 82.

2. The Board have final jurisdiction in determining the fact of nuisance, which they order to be removed. *Kennedy* v. *Board of Health*, 2 Penn. St. 366.

3. The Board of Health have power to fence a lot, if necessary for the abatement of a nuisance. *Wistar* v. *Addicks*, 9 Phila. 145.

4. The power of the Board of Health does not extend to the removal of tenants, and the closing up of their houses, unless justified by the existence of pestilential disease. *Eddy* v. *Board of Health*, 30 Leg. Int. 392; S. C., 5 Leg. Gaz. 381.

5. A resolution declaring that a nuisance exists on a lot, north and south of Master, between Broad and Thirteenth streets, will not sustain a claim against a lot at the south-west corner of Thirteenth and Master streets. *Philadelphia* v. *Houseman*, 2 Phila. 369.

6. What will justify the hauling of a vessel to the wharf before being visited by the port physician. *Board of Health* v. *Micreken*, Purd. Dig., 10th ed., 1326.

7. The Board of Health may recover the expenses of healing sick passengers, though ordered to the hospital, before the oath is made. *Board of Health* v. *Cope*, Purd. Dig., 10th ed., 1327.

8. The action of a Board of Health, fixing the compensation of a physician, whom they were empowered to employ, is conclusive. *Williamsport* v. *Richter* 2 W. N. C. 682; S. C., 33 Leg. Int. 321.

RHODE ISLAND.

By the General Statutes of this State, title VII, chapter 35, sections 11 and 12, the several town councils and boards of aldermen shall be *ex officio* boards of health in their respective towns, and may make such rules and regulations, not repugnant to law, as they shall judge proper for the preservation of the health of the inhabitants thereof, the prevention and abatement of nuisances, the promotion of cleanliness, the removal of the causes and the prevention of the introduction and spread of any contagious or infectious disease therein, either by removing the inhabitants of their respective towns, or for-

bidding or regulating ingress or egress of persons to and from the same, or any parts thereof, or otherwise; and, in case of seaport towns, by making rules and regulations respecting quarantine.

The penalties for breach of such rules and regulations shall not exceed $300 fine or six months' imprisonment for any one offense, unless otherwise provided by law, said fine to inure, one-half to the complainant and the other half to use of the town.

By title XIV, chapter 74, a fine of $400 is imposed upon every commander of any vessel which shall have any person on board sick of small-pox or any contagious or infectious distemper, or which has had any such sick person during the passage, or which shall come from any infected port, who shall anchor within one mile from any public ferry, pier or landing place, or permit any person on board to be landed, or any one to come on board without license first had and obtained from town council of such town where vessel shall arrive.

Such commander shall keep signals in the shrouds. Any person coming ashore from such vessel, without license, may be sent back or confined on shore, and shall be fined $40 and all expenses.

Town council shall send a physician or other suitable person to examine and make report of true state of such vessel, at the charge of the master or owner, and put some person in charge and effectually prevent any communication therewith, at the charge of the master or owner thereof.

Town council shall confine on board, or send to some hospital, all persons suffering or liable to suffer, until perfectly recovered and cleansed, or have passed a suitable quarantine; and also all persons who have gone on board without license, at the charge of such persons respectively.

Suitable persons shall be appointed to see that all goods, etc., in such vessel are properly cleansed before they are brought into any house, shop or warehouse; charges to be borne by the respective owners, and be a lien on such goods, etc.

All goods clandestinely landed shall be forfeited, one-third to use of the State, and two-thirds to use of the person suing for same.

Any person coming by land from any infected place into this State, within ten days from the time of leaving such infected place, shall be fined not exceeding $100, nor less than $10.

Every householder or person shall inform the town council of his town of any case of small-pox, etc., suspected or otherwise, in the place where he dwells, or forfeit $20 to use of the town.

When so notified, town council shall set a proper guard, and shall remove such person to hospital, or otherwise, until recovered and cleansed, or have performed quarantine.

Any person visiting infected houses without license shall forfeit for every such offense $20, and such person shall be confined for the purpose of purification, or have performed quarantine, at the discretion of town council.

Flag to be placed near entrance of *infected* house.

Every person convicted of willfully spreading small-pox or other infectious disorder shall be imprisoned for one year, and if any person shall die of such complaint, the person so convicted of willfully spreading the same shall be fined not exceeding $5,000 and be imprisoned not more than five years, nor less than one year.

Every physician, surgeon, or other person employed by any town council, as aforesaid, and neglecting his duty, shall for every offense be fined $40.

Town council may cause all persons living in an infected district to be removed, after due notice, at their own expense, unless they are unable to remove themselves.

Annual gratuitous vaccination shall be provided, and public vaccinators appointed.

The above act is amended by act of 1873, chapter 289, so far as relates to small-pox on land, but the enactments are substantially the same.

By General Statute, title XIV, chapter 75, "Of Quarantine," each seaport town may appoint a health officer, who shall visit all vessels subject to quarantine, to be paid by owners, agents or commanders of such vessels. Every commander of a vessel refusing to obey the rules and regulations respecting anchoring on quarantine ground shall be fined not exceeding $500, and not less than $20, and any person leaving any ship or vessel under order of quarantine, without permission of the health officer or town council, shall forfeit not exceeding $20, and may be returned on board.

Every person entering into city of Providence, village of Pawtuxet, or the compact part of the town of Cranston from any vessel bound to that port at any time while the quarantine regulations are in force, until such vessel has been visited and examined by health officer and permission granted, shall forfeit not exceeding $20, and may be returned to such vessel in case she is under quarantine.

TENNESSEE.

Corporate bodies are subject, as are natural persons, to general laws enacted to protect and promote the quiet, comfort, health and safety of the people, unless exempted by reason of express stipulation in their charters, or by reason of plain implication, from the nature of the privileges or franchises granted by their charter.

A corporation has the power by general ordinances to prevent the introduction of threatened disease or pestilence into the corporate limits, as small-pox and the like; but it cannot exclude particular persons. *Manchester* v. *Armstrong*, Nashville, 1874. To the powers expressly delegated are to be added those incidental powers necessary and proper to carry out the express powers. 2 Swan, 364; 9 Heis. 578.

The common law of England, so far as it is not inconsistent with the form of government and the nature of the institutions, and not changed by statute, is in force in Tennessee. Mar. and Yerg. 226;

2 Yerg. 35, 484; 2 Hum. 267, 493; 10 Yerg. 434; 9 id. 436, 3] 7 id. 127; 6 id. 334.

By the North Carolina Statutes of 1778, chapter 5, section 1715, chapter 31, section 7, the General Statutes of England, enac. prior to 1607, and those relating to American colonies, were adopt in North Carolina, and continued in force in Tennessee, by the S sion Act of 1789, chapter 3, and by the Constitutions of 1796 a. 1834. 3 Yerg. 320; 1 id. 1, 291; 1 Over 144, 153; 2 Head, 32 1 Hum. 77; 6 id. 29; 4 Hay. 271; 7 Yerg. 529; 9 id. 442; 2 Hu 491; Meigs, 476; 3 Hum. 278; until repealed by the Code, 41, the year 1858.

WISCONSIN.

Board of Health. 1. *Expense of Nursing, etc.*

The statute in respect to boards of health empowers them remove a person sick with small-pox, or other infectious disease a separate building, and to provide nurses and necessaries for person so removed; or if such patient cannot safely be removed, make like provisions for him where he is (§§ 9, 10, chap. 32, R. 1858); but it does not make the public primarily liable, in either case, for the expense of nursing and necessaries. *Kollock* v. *City of Sevens Point*, 37 W. 348.

It will thus be seen that boards of health, whether specially constituted as such, or the governing bodies of cities, towns or villages, if clothed with the properties and powers of a board of health themselves, are legislative bodies and not merely ministerial or even judicial tribunals. It is conseqeuntly their duty to deliberate in determining and framing their by-laws, and to give all proper publicity to their rules and regulations. Their powers appear to be ample if only efficiently enforced, but a lack of moral courage to put the law in motion, or a neglect of those preliminary notices which the law requires, will render nugatory the best conceived theories or neutralize in practice the operation of the most beneficial institutions.

DRAINAGE, SEWERAGE AND TOPOGRAPHY.

REPORT

OF THE COMMITTEE ON DRAINAGE, SEWERAGE AND TOPOGRAPHY.

The work of the committee on drainage, sewerage and topography during the year 1885 has comprised investigations and reports on some twenty-eight cases, besides a number of others where advice has been given to localities on minor questions which did not appear to call for special examination, the facts being clearly set forth in the applications themselves.

The investigations covered by the following reports relate to cases in all parts of the State, in the counties of Westchester, Rockland, Dutchess, Albany, Fulton, Montgomery, Schenectady, Oneida, St. Lawrence, Cortland, Onondaga, Broome, Chemung, Schuyler, Livingston, Ontario, Monroe, Orleans, Wyoming, Niagara and Chautauqua. The subjects considered may be classified under the heads of drainage, sewerage and water supply.

DRAINAGE.

The canals and public works relating thereto have, in certain places, caused saturated areas or swamp grounds, giving rise to malaria. This has been specially the case with regard to the prisms of the abandoned canals. The localities affected have appealed to the State Board of Health to examine the regions and determine, if possible, whether life and health were endangered by the condition of these public works, and if so, to advise a suitable remedy.

These investigations have involved, first, the determination of the existence of miasmatic disease to such a degree as to lead to the suspicion of some local cause or causes; second, the determination of these causes; third, the devising of an effectual remedy for removing the insanitary conditions when such existed.

If miasmatic disease was found and the conditions on which it depended seemed to be caused by works belonging to the State, the committee earnestly recommended that the State apply a remedy when one was easily available. There can be no question that at Elmira, Horseheads, Pine Valley, Havana and Rome, the swampy condition of the abandoned canal beds was endangering the health of the localities. Means were devised for the drainage of these old canals, and appropriation having been made by the Legislature upon these recommendations, the committee have given their advice

and assistance to the Superintendent of Public Works in carrying out the drainage plans which have resulted in marked sanitary improvements.

The work at Rome, Havana and Horseheads has not yet been completed. At Rome the fall of the ditch is so slight down the center of the canal, that the Board advised that the bottom of the ditch should be covered with plank and the sides two feet up with cobble stones. The fall of the ditch being only about six-tenths of a foot to a mile, the maintenance of the flow in it will depend upon the grade being kept even and perfect, and upon reducing the friction to a minimum. It was considered that this could best be accomplished in the manner described in the report, but owing to unusually high water this season the Superintendent of Public Works considered it best to postpone the planking and paving of the work to the coming year. The drainage works at Pine Valley and Havana will probably be complete before spring. At Elmira the water in the prism of the old canal was being seriously polluted by leakage from the State Reformatory sewer, which was so situated that a part of it could not be covered with earth. The Board having recommended the construction of a new sewer, and the Legislature having made the necessary appropriations, a sewer has been constructed by the Superintendent of Public Works, under the advice of the committee, but subject to the conditions imposed by the city of Elmira as respects the *kind* of sewer to be built and the *route* to be followed.

By order of the city council the sewer was made of cement pipe to conform to the other sewers of the city, but every effort was made, by inspecting the kind of cement used, to have the pipe of the best quality.

Under the law the city must agree to accept and maintain the sewer as a part of the city system giving the Reformatory the perpetual right to dispose of its sewage through this channel.

Another class of drainage examinations and reports have been made in connection with swamps, caused by building railroad embankments. Railroad corporations have sometimes created serious miasmatic conditions by the construction of their embankments. Where localities have felt endangered from this cause, appeal has been made to the Board, and the committee have caused examinations and reports to be made. Where the corporations were clearly at fault and a remedy available, the changes advised by the Board have usually been made. Other causes have been investigated and practical remedies devised for miasmatic conditions, produced by mill-ponds and tidal swamps.

SEWAGE DISPOSAL.

The question of sewage disposal in many of the towns and public institutions of the State has become one of increasing difficulty. In the treatment of these subjects large sanitary information and experience, as well as technical engineering knowledge is required.

The *water* of the sewage after flowing through the sewers must eventually be returned to some one of the natural water-courses of the region. The interest of all those on the lower part of this water-course require the maintaining of the stream in a practically unpolluted condition. The amount of contamination which may be permitted in any stream depends upon the purpose to which it is put, the physical condition of its channel, and the population along its banks.

It is clear that the water of the sewage must be turned into lakes or streams; but before such discharge the sewage should be so treated that no sanitary evil can result to those living near or using the stream. The exact degree to which it is necessary to purify sewage in order to secure such a result differs with the circumstances of each case, and the method of sewage purification will in each case depend upon the degree of purity to be obtained and the local conditions about the outlet. In the case of Lockport, Mount Vernon, Middletown and Warsaw, the committee have found sewerage to be essential to the health of the towns, and that they must, therefore, advise it. While on the other hand it has been necessary to consider in the disposal of this sewage the health and interests of people living in other towns and counties on the streams which must receive the water of the sewage.

The wants, the interests and the rights of various communities have thus to be considered, and the plans for sewage disposal adjusted to secure the desired sanitary improvements without producing evil consequences. In the case of the Binghamton asylum the method of sewage disposal used by this State institution was justly causing alarm in the city of Binghamton, and on the recommendation of the Board, appropriation was made by the Legislature, and a plan devised by Mr. Horace Andrews, civil engineer, was approved, and has been executed with most satisfactory results.

WATER SUPPLY.

Since the formation of the Board its advice has been constantly sought as to the purity and wholesomeness of various water supplies used for potable purposes by cities and villages throughout the State. After an experience of some four years with a large variety of cases, it was concluded that the laws of the State were not sufficient to secure the sanitary protection of water supplies. The character of the water supplies of different places varies so much, and the dangers of pollution are so different in different places, that it was impracticable to prepare a general law which could be efficiently applied without being unnecessarily onerous in its restrictions to some localities. A law was, therefore, prepared and recommended to the Legislature by the State Board, and with slight modification passed by the last Legislature. This law imposes upon the State Board of Health the duty of making rules and regulations for the protection of potable water supplies in the State, and gives to such

rules and regulations the force of law when approved by the county judge of the county in which the water supply is situated.

The effect of this law is to enable the State Board to study the special dangers which threaten any particular water supply, and to adapt the protective regulations to the peculiar dangers of the case. Under this law the city of Rochester and the village of Fredonia have during the past summer had rules and regulations made for the protection of their water supplies, and in three other cases informal advice has been given which has substantially secured the same end.

In the case of the city of Rochester, the rules and regulations have been efficiently carried out, although the water supplies come from two different counties, and are used by the city of Rochester, situated in a third county. They have protected the water from pollution, and yet have not proved onerous to the large and varied population living on the water-shed. Not only have the rights of the property-owners been respected, but the rules made primarily for the protection of the people of Rochester have been of marked sanitary advantage by producing greater care and cleanliness in the premises of those living on the water-shed.

The case of Cortland, described in the report of the expert, shows how easily the health of the whole community may be threatened by the willfulness or carelessness of a single individual, as to the matter of polluting a public water supply. Sometimes, as in the case of Nyack, the danger to a water supply arises from too close proximity to cemeteries.

Occasionally where water is stored, the raising and lowering of the lake or reservoir undoubtedly seriously affects the health of the surrounding community. Such a case is illustrated at Rye lake, in Westchester county, where it was permitted by a special act of the Legislature.

The law authorizing the formation of the new aqueduct commission of New York makes it the duty of the State Board of Health to frame sanitary rules and regulations respecting the storage of water in the county of Westchester, and under the later law of 1885, the Board may at any time be called upon to make detailed rules and regulations for the protection of the water supply of the city of New York.

The problem of protecting the health of the people of Westchester county from the ill effects of the storage of great quantities of water for the use of New York city, and also protecting these waters from pollution, is a difficult and complicated one, and has engaged the serious attention of the committee, and of Consulting Engineer Gardiner. As yet no official action has been taken in the matter.

The case of the city of Albany affords another illustration of what has been accomplished by this Board in securing pure water for the citizens of the State. Upon examining the insanitary condition of the Albany basin, it was found, during a careful investigation

made in the autumn of 1884, that the sewage of Albany was reaching its water supply, which was taken from the Hudson river. This led to an examination of the purity of the Hudson below Troy, and to the conclusion on the part of the committee, that the Hudson river above Albany was receiving so much sewage as probably to render it unfit for potable purposes.

As the danger was an increasing one, the Board addressed to the mayor and common council of the city of Albany, in November, 1884, the following resolution:

Resolved, That the mayor and corporation of the city of Albany be advised that, in the judgment of the State Board of Health, it is important that a thorough investigation be made of the dangers of the present water supply, and of the other possible sources from whence a supply could be obtained.

The full report of the Board and its experts was published and widely distributed. The matter provoked much discussion, and at last resulted in the creation of a special water commission, empowered, as the State Board had suggested, to examine all practicable sources of water supply to the city, as well as the sanitary condition of the Hudson river itself. The city board of health also made an investigation of the condition of the river. Prof. Mason, of Troy, after a very thorough chemical analysis of samples of the river water, taken between Lansingburgh and Albany, condemned it as having already become polluted with sewage beyond the limits recognized among chemists as safe. The chemist of the special commission, Prof. Leeds, arrived at the same conclusion, and the commission condemned the river water as now furnished to the city, as unfit for potable purposes, and recommended the supply from another source. Their recommendations were adopted by the common council, and under the law, the commission are empowered to proceed to furnish the city of Albany with a supply of pure water.

Such satisfactory results encouraged the committee in making every effort to follow out the work of securing pure and wholesome water for the citizens of the State, by investigating water supplies, detecting sources of pollution and setting clearly before the people the facts ascertained, and the direction in which remedies should be sought.

ERASTUS BROOKS,
Chairman.

DRAINAGE OF ABANDONED CANAL, ROME.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — Chapter 312 of the Laws of 1885 directs the drainage of the channel of the abandoned canal in the city of Rome and makes appropriation therefor, the work to be done by the Superintendent of Public Works, under the advice and direction of the State Board of Health. In pursuance of this act the matter was referred to me with power, and Mr. O. S. Wilson was sent to make surveys of the ground and report a plan for the drainage of the canal. His report is herewith transmitted with my approval of its recommendations, but with certain modifications as to the size and character of the channel which it is proposed to construct. The exact character of the drainage channel which I approve is hereinafter described.

Mr. Wilson's plan was made when the water was very high. The water is now low; and after examining into its present condition, Mr. Wilson is agreed with me as to the modifications of his plan.

Before discussing the details of this drainage plan, Mr. Wilson calls attention to the necessity for a system of sewerage in Rome, and to the present unwholesome methods of sewage disposal which are practiced there. In view of the great importance of this matter, I made a sanitary reconnaisance of the city and had a meeting with the mayor of the city and the board of health.

The streets of Rome are now so well graded and the gutters so well paved that there is no difficulty as regards the surface drainage of the city. Where the surface grades have proved too flat to carry off storm water, cheap and short storm-water sewers have been laid only three or four feet below the surface. These gutters and short storm-water sewers find outlet into Wood's creek; the existing canals and the bed of the old abandoned canal are on the southern side of the city. There are severe ordinances against turning any house drainage of any kind into these storm-water ways, and the ordinances are so rigidly enforced that I find no case of their violation. Where the storm-water drains of the city enter the bed of the abandoned canal there is absolutely no evidence of any pollution from this cause.

The great difficulty in Rome arises from want of some proper means of sewage disposal. The greater part of the city put the filthy wastes of their dwellings into the soil, which is of a very porous coarse gravel, down to the level of the ground water, which averages, perhaps, twenty feet below the surface in the higher part of the city.

The soil is so porous that the leechings from the privies and cesspools pass rapidly away to the ground water. The city has an ample water supply; and where people have abandoned the use of their wells, they have, in a great many cases, made cess-pools of the wells, so that an enormous amount of filth is reaching the ground water directly.

The pollution of the ground water and of the soil of course pol-

lutes the wells which are still in use, and in this way very seriously endangers the public health. It also endangers the health of all people by poisoning the ground air which rises through the cellars into the houses. This is especially while the ground is frozen, so that fevers and other diseases, resulting from filth poisoning, will be very likely to occur in the latter part of winter or early spring after the people have been breathing polluted air for several months.

The soil of Rome must contain from 30 to 40 per cent of its bulk of air. This air, being in contact with polluted soil and the grossly polluted water, must of itself become contaminated, and will eventually produce serious consequence to the public health of the city. A small number of people have built private sewers which empty into the canal. The sewage from the hotels finds its outlet in this way. As near as we could ascertain there are some twenty private drains carrying sewage which enter the Black river and Erie canal at Rome. The Superintendent of Public Works has ordered all sewers emptying into the canal to be cut off after reasonable notice to the owners. The question of a system of sewerage must, therefore, be immediately considered by the citizens of Rome.

With this view I made a very general reconnaissance of the city, and my impression is that it could be sewered by the separate system which will provide for the carrying away of all the sewage and for the drainage of cellars at a cost not to exceed $100,000; and that the outfall for this system may either be into Wood creek or into Mohawk river, or into both, and that to prevent the creation of nuisance it would be necessary to purify the sewage before the affluent is allowed to pass into either of these streams.

DRAINAGE OF ABANDONED CANAL.

The channel of the abandoned canal which skirts the southern side of the city of Rome is about 11,000 feet long. The fall is so slight and the channel so large that in time of low water the flow is almost expended. This abandoned channel is used as the outfall for five large ditches which drain the land that lies to the south of the city. It is of great importance that it should be kept open as an outfall for these drains.

The surface water from a number of square miles reaches the old channel so that in time of heavy rains a large amount of water finds its way to the abandoned canal; but the channel of this canal is in its present condition a nuisance owing to the fact that very large accumulations of organic matter have taken place in it, owing principally to the rapid growth and decay of vegetation in the channel. It has in time of low water carried into it by surface waters vegetation from the surface of the drainage area.

The old bottom which is now from twelve to twenty feet broad is covered with this decomposing organic matter or with a thick growth of aquatic plants which find nourishment from it, and so impede the current as to produce stagnation of the water. In only three places was I able to detect house or manufacturing wastes en-

tering into the channel. One of these drains was from the knitting mill and there was no question that it brought down human excrement. The other is an old box drain opening close to the knitting mill drain, the water from which had an offensive odor. It is said that this drain was long ago cut off from house connections and that the offensive odor from the water is due to the fact that the drain was not properly cleaned when it was cut off. The third drain is from the oil tanks and brings down apparently merely oil which creates an offensive odor. The amount of organic matter brought down by these is so very small that the condition of the channel of the old canal below them is hardly any worse than it is above. They ought, however, to be cut off, and nothing but storm water should be allowed to enter the old canal.

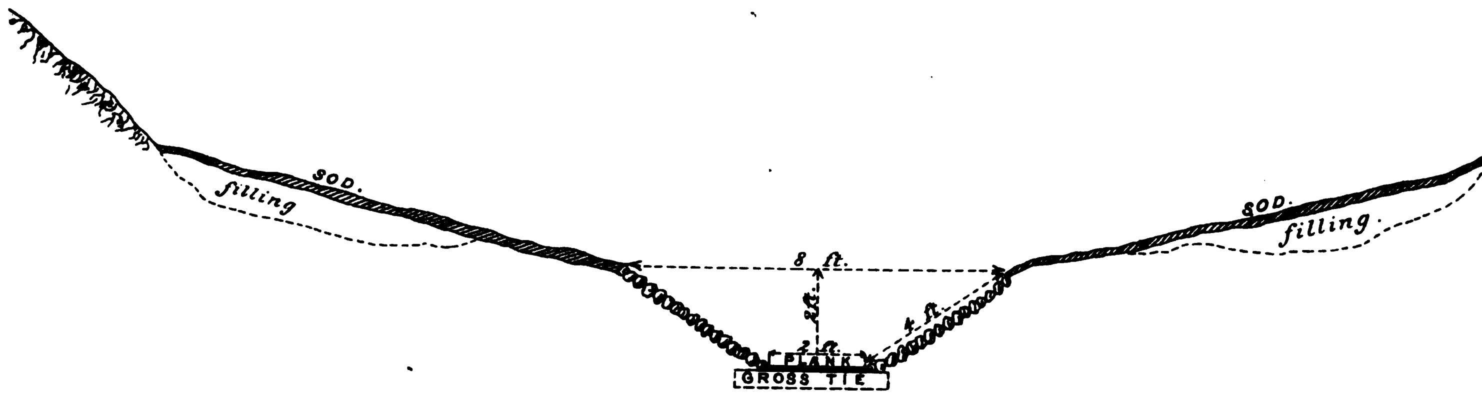
It appears, therefore, that the condition of the channel is a nuisance due not to the sewage from Rome being turned into it, but from accumulations of organic matter and silt. The water from the old canal finds outlet into Wood's creek just above Dockstatter street. The flow of this creek is sufficient to prevent any accumulations of water in the old canal, if the channel of the canal was put into condition to deliver its water into the creek. It is, however, possible to increase the flow of this creek by a small expenditure of money.

PLAN FOR DRAINAGE.

I examined every part of the old canal from the dive culvert at Whitehall creek to the entrance into Wood creek, and also the channel at Wood creek to the culvert under the Erie canal, a total distance of nearly five miles. From Whitehall creek down to Lawrence street the fall of the old canal is so slight and the channel so broad and so filled with vegetation and the amount of water entering the canal is so small that no flow is perceptible. It is not until after passing the entrance to a large drainage ditch below Lawrence street that a marked flow is observed. From James street down the fall increases, due to the channel having been cleaned some years ago, and here a very marked flow begins. From James street down to Jay the flow at present, except where it is dumped into pools, is sufficient to prevent any stagnation. The fall here is about nine inches to the thousand feet. Above Lawrence street there are no houses in the neighborhood of the old canal, nor are there likely to be.

The old canal passed out of the settled portion of Rome at Jay street. It is of the utmost importance to the health of the people that the channel should be in perfect sanitary condition between Lawrence and Jay streets, a distance of 5,725 feet. Below Jay street a perfect cleanliness of the channel is of less importance; but its grade is full of importance as facilitating the outfall of the upper part of the channel.

From Mr. Wilson's profile it appears that the best grade can be secured by cutting down the channel of the old canal in the upper part of Wood's creek, making an even grade from Lawrence street



Adopted Section

SCALE 1in. - 4ft.

and Dockstatter avenue, near the Hammel farm. This is a distance of 8,865 feet. The fall will be about six and one-half inches to the thousand feet. The grade secured will be almost as good as if an even grade should be made from Lawrence street to the canal culvert, a distance of 21,000 feet. The fall from Lawrence street to the canal culvert is some thirteen feet. And if the old canal and Wood creek were graded to an even grade the fall would be about seven inches to the thousand feet. It, therefore, appears that in the matter of grade there would practically be no difference between a plan contemplating a rectification of Wood creek and one that would simply secure the grading of the old canal channel. I, therefore, recommend that the channel of the old canal between Lawrence street and the dry-dock culvert and the ditch and channel of Wood creek from the dry-dock culvert to Dockstatter avenue, be graded to a slope of six and one-half inches to the thousand feet. As regards the size of this channel it is important to its low-water flow that it should be as small as possible.

From an examination of the banks of the stream I find that the floods in the old canal move so slowly that there is no perceptible washing of the banks down to within six inches of the low-water surface. A heavy sod grows on these banks, which is not disturbed by the floods that sometimes cover them.

In view of this fact and of the very small amount of water flowing in the channel in summer, when it is most important that it should not stagnate, I recommend that the cross section of the channel be made only two feet on the bottom and two feet deep, with slopes of one and one-half to one. This will give a channel of two feet wide on the bottom and eight feet on the top, with a depth of two feet.

I recommend that the bottom of this channel be made of two-inch plank in order to secure smoothness and the most rapid flow on the light grade. The smoothness of the bottom will also facilitate cleaning.

The slopes of the channel should, as Mr. Wilson recommends, be made of cobble stones. These slopes will measure four feet on their surface. The channel here described will provide for the flow of the stream at all times, except unusual floods. To prevent the washing from floods, the bank above the cobble stones should be sodded. There are plenty of sods growing now upon the banks to accomplish this at a very small cost. I consider sodding better than sowing the banks with grass, because the sods already on the borders of the old channel have a very large mass of roots, which will very effectually prevent any washing in time of floods. The general level of the ground being some five or six feet above the old channel, the waterway included between the sodded banks will be ample to carry off freshets, and the movement will be so slow that it is not probable that any wash will take place. A diagram of the channel described is here given.

Above Lawrence street, I agree with Mr. Wilson that the only

method of treatment will be to partially fill the old channel, leaving a narrow ditch for drainage purposes. This filling need not be deep to secure a great improvement in its sanitary condition. A filling of a foot and a half in the center of the channel, and of three feet on the sides would remedy the greater part of the evil which now exists in this raw, swampy and stagnant channel.

A small sum should be expended in cleaning out the channel of Wood creek, and in cutting away a few shallow bars which impeded the flow of the stream. With these slight modifications in the channel there will be ample outfall for the water from the old canal.

The first and most important part of the work is the grading from Dockstatter avenue to Lawrence street, and the constructing and paving of the channel from Jay to Lawrence streets. The appropriation is undoubtedly sufficient to accomplish this, and leave something over toward filling the canal above Lawrence street, and the carrying out of the measures suggested for the improvement of the flow of Wood creek.

Very respectfully yours,
JAMES T. GARDINER,
Consulting Engineer.

REPORT OF MR. WILSON.

JAMES T. GARDINER, Esq., *Consulting Engineer:*

SIR — The city of Rome, N. Y., contains about 12,000 inhabitants, and is situated upon a low divide between the waters of the Hudson and those of the St. Lawrence river.

The Mohawk river flows through the east and Wood creek through the west side of the city. The divide between these is less than twenty feet high in most of the city and is not easily located. It is I believe the only city in America that can sewer naturally into two great river systems.

The Black River canal joins the Erie at Rome. At an early day a canal with locks joined the Mohawk river and Wood creek, evidences of which still exist.

Before the enlargement of the Erie the main canal ran near the southern limit of the present city but was abandoned about forty years ago. The land south of the city lying between Whitehall's and Mud creeks is very flat and swampy. Much of this land has been reclaimed. About thirty years ago legal steps were taken to drain this area, and ditches were dug draining into the abandoned canal, some of which are indicated in the accompanying map. The soil upon which the city is built is loam or sand from one to three feet deep, underlying which is about eight feet of very coarse gravel; then a stratum of clay varying from a few inches to two feet in thickness, and beneath this is a stratum of finer water-washed gravel.

CITY WATER SUPPLY.

About twelve years ago a system of water-works was put in, taking the water from the Mohawk, about two miles north of the city. At present about one-half of the population relies upon common dug or driven wells that range from twenty to thirty-five feet in depth. Some uneasiness exists respecting the purity of the Mohawk river water furnished, owing largely to the amount of earth in suspension. Although I made no special examination I venture the opinion that the hydrant water is vastly superior to any well water in the city for reasons that will be given below.

DRAINS AND SEWERS.

The city has put in more than a mile of sewer pipe-drains to carry off the surface rain and snow water from the streets. One of these sewers empties into the old canal under the James street bridge. As might be expected some of the residents are desirous of putting their house sewage into these drains; but the local board of health are determined to keep such sewage out and deserve much credit for their watchfulness and care in this matter. Some of the hotels and business places and a few residences have sewers leading to the Erie and Black River canals which empty sewage. There are about twenty such sewers, most of them emptying below the water-line when the canals are full. Rome is on the long level, nearly sixty miles in length, of the Erie canal, and the summer flow of the Mohawk river and Wood creek is taken into the canal. These together with the water locked down the Black River canal forms the principal feeder for this long summit level. As a result there is a current in the canal both ways from Rome and the sewage emptied in is carried away from the city. While this method of sewage disposal is a benefit to Rome it is contrary to law and should be discontinued. Some residences supplied with river water that are too far from the canals to sewer into them economically have cess-pools into which house sewage is run. Some of these cess-pools are old abandoned wells dug into the water-bearing strata, from which, as stated above, about half the citizens derive their water supply. It is evident that this method of sewage disposal is the very worst that could be devised and it will, sooner or later, be fruitful in producing and spreading disease.

The city has no system of sewers, and the distance to which it seems necessary to go for an outlet has acted as an insurmountable barrier when the subject has been broached. It will be necessary to go about two miles east to reach a sufficient summer flow in the Mohawk to empty sewage into; or about the same distance west to reach a similar state of water in Wood creek. The city of Rome is well adapted to enjoy the advantages of the separate system of sewers and it can better afford to put such a system in now, than run the risks they now do, which would be much enhanced should the sewers now emptying into the canals be cut off by the State authorities, as

they doubtless should and probably will be. The city is now ing a low death-rate.

After the preceding remarks of a general character, I now ap the main subject of this report.

THE ABANDONED CANAL.

This extends from the road near the dive culvert, through Whitehall's creek passes under the Erie canal, on its way Mohawk, about two and one-tenth miles north-westward, to n dry dock.

Along the line of this old canal several ditches enter fron sides, which with the overflow of Whitehall's creek in the makes quite a stream, but in summer forms an elongated ce with little water, and that stagnant. The bottom is fillec aquatic vegetation which hinders what little flow of water tl from rains. At the crossing of Lawrence street, which crosse angle with the canal, there is a stone arch culvert which ma angle with both the street and the canal, that throws the leaving it against the cemetery bank, with the effect of washi bank away, and washing a hole out in the canal bed. Efforts been made to protect this bank, but so far have failed. At street a sewer empties; on the east side of the N. Y. C. crossing a drain from the knitting mill empties. I did not as if any deleterious material is emptied there. About a hundr west of said railroad crossing a drain enters from the north empties more or less oil refuse, which not only renders offensive, but pollutes the water perceptibly for a mile below drain is a nuisance and should be abated. At the west end stretch of abandoned canal the water enters Wood creek, whi been straightened at this point for about 600 feet. At this also is a culvert under the R., W. & O. R. R., through whi water from the dry dock, when it is emptied, enters the old The difference of level in the canal is so slight (see profile) summer the emptying of the dry dock suddenly, of so large ume of water, causes a back water flow as far as Jay street, the creek below gradually carries it off. A deep hole ha washed out below said railroad culvert. The only place wh water from the old canal can get through under the Erie c about two miles—two and six-tenths miles by the windings creek—west of this railroad culvert, where a culvert was cons for Wood creek. About half way down this creek Mud creek it from the south, and is about the size of Wood creek abc junction. These creeks run through low land, are from six teen feet wide and about four feet deep. There are several where fallen trees and stumps have formed partial dams.

At the time of my survey the streams were unusually high to frequent heavy rains, and while the profile given is fairl rate, I will re-run the levels during low water and give a mo profile and grade before work is begun, frequent benches been left for this purpose.

PROPOSED PLAN.

As it will be necessary to provide a free outlet for the drainage of the canal, I would propose the removal of the trees and other obstructions in the creek channel, and would advise that an extreme limit of $500 be the amount to be expended in the removal of obstructions and bars. Much less than that amount *may* suffice.

Through the old canal bed I propose to narrow the water channel for the summer flow of water. To dig a ditch about four feet wide on the bottom with sloping sides of one and a half or two to one; to be paved (see sketch appended) with stone in ground too soft to remain in place unsupported. I think hard clay or gravel will be found most of the way that will not require paving.

The length of the old abandoned canal is about 11,000 feet. The ditch should be dug through the entire length, the material thrown up on the bank, the whole bottom afterward covered with clean earth from the banks. Cobble stones can be obtained for eighty cents per cubic yard, delivered, which will pave about fifty square feet of surface, as the stones should be somewhat larger than ordinarily used in street paving. The paving of the sides of the ditch to be stopped at a height of about three feet from the bottom. There would be about sixteen square feet of paving per foot of length of ditch, and about one cubic yard of excavation.

I consider the following a liberal estimate per foot of length of the ditch:

16 square feet paving, at 4 cents	$0 64
1 cubic yard excavation, at 15 cents	15
	$0 79

I would suggest that, so far as practicable, the proposed ditch be completed and paved at the west end and as far east as possible, so that what is done may be of permanent value. The State may never need this land for canal purposes again, and were it not necessary to provide a ditch for draining the low land on the divide, it might be the cheapest in the end to fill the canal as it was originally; still if it can be made unobjectionable from a sanitary standpoint and still answer as a main drainage ditch, it will be of great benefit to the adjacent owners and indirectly to the State at large; at the same time it would be to the advantage of all living near it to see that it is not made a dumping ground for dead animals and other objectionable refuse, simply because it is State land and not continually under close supervision.

I would suggest that the bank of the creek opposite the culvert at the dry dock be protected so it will not wash. I am not certain that it is the province of the State to do this, however.

A heavy wing wall of stone at the lower end of the culvert, under the Lawrence street crossing, should be so constructed as to turn the current in a direction parallel to the center of the canal. It would,

in my judgment, prevent the washing of the cemetery bank, and would cost about $50. It may also be necessary to do some cleaning out of a channel of Whitehall's creek, but nothing of an expensive nature will be necessary.

Respectfully submitted,

June 12, 1885 O. S. WILSON, *C. E.*

ESTIMATES FOR ROME.

Excavating *Wood creek* below dry dock		$300 00
Widening and deepening 700-foot ditch, at 20 cts	$140 00	
Cleaning and deepening 1,600-foot creek, at 10 cts	160 00	
Dry dock culvert to Jay street — Deepening and grading channel, 1,750 feet, at 20 cts		350 00
Jay street to Lawrence street, 5,800 feet, at 78 cts		4,524 00
Providing material excavated will do for lining, the estimated price per foot is 70 cents, or, $4,060 made up as follows:		
8 square feet paving, at 4 cents	32 cents.	
5 feet hemlock, at $13 per M	7 cents.	
Laying same and spikes	3 cents.	
Excavation and filling one cubic yard, at 25 cts.	25 cents.	
Sodding banks	3 cents.	
	70 cents.	
Lining, one cent extra per square foot	8 cents.	
Building wing wall at Lawrence street		50 00
Filling and *grading* 3,500 feet *above Lawrence street*, 7,000 cubic yards, at 25 cents		1,750 00
Contingencies, *engineering* and *supervision*		1,026 00
Total		$8,000 00

O. S. WILSON.

THE ELMIRA REFORMATORY SEWER.

The committee herewith reports to the Board for its approval the plan for the Elmira Reformatory sewer, submitted by Consulting Engineer James T. Gardiner, and recommends its adoption.

ERASTUS BROOKS, *Chairman*,
GEORGE W. COOKE,
EDWARD M. MOORE, *President*,
ALFRED L. CARROLL, *Secretary*,
Committee.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — Nearly a year ago I visited Elmira to examine the condition of the abandoned Chemung canal in that city, and I found that the prism for nearly half a mile was a prolonged cess-pool, and that one of the most prominent sources of pollution of the water in the abandoned canal was from the Elmira Reformatory sewer which is laid in the prism of the canal, but for a long distance is on the side slope of the canal, and raised above the surface of the water in the canal. This sewer is made of cemented pipe with open joints, and for much of its length was uncovered. The action of the weather had broken and enlarged the joints in many places. The sewage was freely running out into the canal.

The abandoned canal appears now to have become private property. As chairman of the committee of drainage, sewerage and topography I recommended in February last that the State Reformatory should proceed as soon as possible to construct a tight sewer covered with no less than three feet of earth, the same being built upon public property, where it would always be accessible for repair.

At my request the city engineer made a preliminary survey to determine whether a new sewer could be built following the line of a public street. The survey showed that it was practicable, and an appropriation for this purpose having been made by chapter 346 of the Laws of 1885, Mr. O. S. Wilson, by the direction of the Superintendent of Public Works, has made a final survey of this route, which proves it to be entirely possible and the only practicable route by which the Reformatory sewer can find outlet into the city system without traversing private property.

I, therefore, recommend that the present Reformatory sewer be cut and intercepted on Reformatory street between the Erie railroad track and the abandoned canal by a sewer fifteen inches in diameter where straight, and eighteen on curves, and passing along Park avenue, to Baldwin street, to Division, to Maxwell avenue, to East Washington avenue, and there enter the State system of sewers. The distance will be about 5,400 feet and a grade of one in a thousand is practicable. From East Washington avenue up to Division street the pipe should be eighteen inches in diameter, as the city will doubtless use it as part of their system. Just below each street crossed and at each end of curves a manhole should be put in, also one at each connection with existing sewers. One should also be placed on the east side of the New York, Lake Erie and Western railroad crossing. As there will be but a few feet of earth on the pipe under the railroad track, it would be wise to make the sewer at this point of cast-iron pipe, fifteen inches in diameter.

In accordance with the law no work should be done until the proper authorities of the city of Elmira shall have given permission to lay the sewer in the streets of the city and to connect with the city

sewers, and in consideration of the State granting to the city the right to use this sewer for city purposes, nothing should be done until the city agree to care for and maintain the Reformatory sewer within the corporate limits of the city.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

SPECIFICATIONS FOR THE ELMIRA REFORMATORY SEWER.

The line of the sewer to be constructed is as follows: Beginning at a point in the Elmira city sewer in East Washington street, near Maxwell avenue; thence by a curve into Maxwell avenue; thence along said avenue to a point near Division street; thence by a curve into said street; thence along Division street to a point near Baldwin street; thence by a curve into said street; thence along Baldwin street to a point near Park avenue; thence by a curve into Park avenue; thence along said avenue to a point near Reformatory street; thence by a curve into said street; thence along said street to a point to be selected by the engineer, where a junction will be made with the Reformatory sewer, now laid in said street.

The length of said curve will be about 5,300 feet, of which about 2,500 feet will be of eighteen-inch pipe, and about 2,800 feet will be of fifteen-inch pipe; about 100 feet (more or less) of said fifteen-inch pipe will be cast iron, weighing about 120 pounds per foot of length.

The sewer pipe to be used shall be of first quality, salt glazed, vitrified, earthenware pipe, without cracks or blisters.

About 120 six-inch Y branch connections will be used, about 70 of which will be in eighteen-inch pipe, and about 50 in fifteen-inch pipe (none in the iron pipe); these shall be put in at points to be designated by the engineer.

The connections should be put in as often as necessary for city use.

The range in depth of excavation is from 3.1 feet to 11.7 feet, with an average depth of 7.75 feet.

The soil, so far as is known, is gravel and clay.

There will be needed about twenty man-holes. The engineer reserves the right to make the number one or two more or less.

The sewer will be staked out by the engineer, and will follow, as far as practicable, the center line of the street.

The contractor will be required to preserve all stakes and bench-marks until permission is given by the engineer to remove them.

EXCAVATION.

All excavation should be by open cut from the surface.

Should the contractor think it best to keep the sides of the excavation vertical, by bracing or otherwise, it is expressly understood that it shall be done at his own cost.

The sides of the excavation, whenever it shall be necessary in the opinion of the engineer, shall be supported by suitable plank and

shoring, but no allowance will be made therefor, unless the same is left in the trench by written order of the engineer.

The trench shall be dug to within six inches of grade, by measurement from the witness stakes on the surface. The last six inches shall be taken out after the grade pegs have been set in the bottom of the trench by the engineer. Grade pegs will be set by the engineer every twelve and one-half feet on the center line at the bottom of the trench.

In no case, without previous written permission from the engineer, shall more than 200 feet of trench be opened in advance of the completed sewer.

The material excavated shall be laid compactly on the sides of the trench, and kept trimmed up so as to be of as little inconvenience as possible to the traveling public and adjoining tenants.

The contractor shall not obstruct the gutter of any street, but shall use all proper measures to provide for the free passage of surface water along the gutters.

The contractor shall provide for all water-courses and drains interrupted during the progress of the work, and replace them in as good condition as he found them.

The earth shall be removed under the sockets of the pipe so as to allow the pipe to rest evenly along its whole length.

The excavation at the joints shall be at least six inches outside of the joints to be perfectly cemented.

The contractor will be required to observe all the ordinances of the common council in relation to obstructing the street, keeping open passage-ways and protecting the same when they are exposed and would be dangerous to the public travel.

Upon the suspension of any work the trench is to be refilled and repaved or re-macadamized as the case may be, unless the engineer shall otherwise direct; and all materials, surplus earth, sand, rock and rubbish removed from the street within three days thereafter, or they will be removed at the contractor's expense.

In the progress of the work the contractor will be required to preserve from obstruction all railroad tracks which may be affected by the prosecution of the work herein described; and also afford the necessary facilities to the company or companies owning such tracks; or to their agents, in their preservation of the same from injury, without extra charge therefor.

Under the railroad tracks and over the culvert on the abandoned Chemung canal at the discretion of the engineer, sixteen-inch cast-iron pipe shall be laid with tight joints. The pipe to be pressure pipe of about five-eighths of an inch in thickness and weighing about 190 pounds per running foot.

PROTECTION OF WATER AND GAS PIPE.

The contractor shall do whatever may be necessary to keep in position and protect from injury all water and gas pipes, lamp-posts,

service pipes, and all other fixtures which may be met with in carrying on the work.

In case any of the said gas or water pipes or other fixtures be damaged, they shall be repaired by the parties having control of the same, and the expense of such repairs shall be deducted from the amounts which may become due the contractor.

So far as is now known no gas pipes will be encountered and but one six-inch water pipe will be crossed, and that is supposed to be above the grade of the sewer.

PROTECTION AGAINST ACCIDENTS.

The contractor shall erect suitable barriers around all excavations to prevent accidents to passengers on the streets, and shall place and maintain during the night sufficient red lights on or near the work.

The contractor shall have charge of and be responsible for the entire line of sewers for whose construction he has contracted, until their completion and acceptance.

BACK FILLING.

The earth filled around and on top of the pipes shall be free from stone and tamped with the utmost care, so as to obtain the greatest compactness and solidity possible. In filling, the earth shall be kept at the same height on both sides of the pipe. The earth shall be rammed in layers of not more than one foot thick up to the surface of the street, and in no case shall the number of men filling be more than twice the number of men ramming.

The trench must in all cases be filled to the proper grade with suitable material, free from stones over four inches in diameter. Should there be a deficiency of proper material for refilling the trench, the contractor will be required to furnish the same at his own cost.

REPAVING AND RESTORING STREETS.

Where the pavement has been removed, it must be replaced by the contractor and left in as good condition as it was before being removed.

All surplus material and rubbish must be removed by the contractor.

All work of restoring the surface of the streets shall be done to the satisfaction of the engineer.

PROTECTION OF PROPERTY.

The contractor shall, at his own expense, shore up, protect and make good, as may be necessary, all buildings, walls or fences injured or liable to be injured during the progress of the work; and the contractor will be held responsible for all damage which may happen to neighboring property from neglect of this precaution or from any other cause connected with the prosecution of the work.

PIPES — HOW LAID.

Especial care must be taken to lay the pipe to the exact grade and line.

All pipes previous to being lowered into the trench shall be fitted together and matched, so that when jointed in the trench they may form a true and smooth line of pipes.

It is desirable that the pipe and the wire connections be from the same maker as otherwise the chipping and fitting necessary to form a joint is not only troublesome but objectionable.

All pipes shall be laid with a straight edge, beveled to grade, furnished by the engineer. One end of the straight edge shall be placed on the nearest grade peg and the other on the flow-line of the pipe to be laid, and the height of the pipe shall be so adjusted that a builder's level placed on the upper edge of the straight-edge shall be perfectly level. The level used for this purpose must be kept in perfect adjustment by the contractor.

JOINTS.

A gasket of oakum or other material approved by the engineer shall be pressed into the joint around the entire circumference of the pipe to prevent the entrance of cement to the inside of the pipe. No joint shall be cemented until the gasket of the next joint in advance has been completed.

The cement shall be pressed into the space between the socket and spigot so as to entirely fill the space, and the bevel joint at the end of the socket shall be smoothly and evenly made.

Special care must be taken to make perfect joints at the bottom of the pipe.

The excavation made for the socket of the pipe shall be filled with sand to support the cement firmly in position.

When the joint is completed, great care must be taken not to disturb the pipes.

CEMENT.

The cement for filling the joints shall be pure, fresh-ground Rosendale cement of best quality, with only enough water added to give it the proper consistency and shall be used as soon as mixed.

BRANCHES.

The "Y" branches and man-holes shall be placed at points indicated by the engineer. Their location will be indicated by stakes driven at the sides of the trench.

The "Y" branches shall be elevated to correspond to the lateral sewers and house-drains entering them. They shall be closed with an earthenware cap, and the space above the cap shall be filled with sand covered with a thin coating of cement.

SEWERS TO BE KEPT CLEAN AND FREE FROM WATER.

All the pipes must be kept thoroughly clean, and no water will be allowed to flow through them in any case whatever, during the construction of the sewers, unless properly settled.

When the trench is left for the night, or the pipe-laying is stopped by rain storms or any other cause, the ends of the pipes must be closed water tight with a plug and cement, or with bricks and cement, as the engineer may direct.

When running quicksand or other treacherous ground is encountered, the work shall be carried on day and night, should the engineer so require.

ARTIFICIAL FOUNDATION.

Whenever ordered by the engineer, in writing, the contractor shall excavate to such depth below grade as the engineer may direct, and the excavation shall be brought to grade with such material as shall be ordered by the engineer; the extra work to be paid for upon the estimate of the engineer.

If the contractor excavate below grade without orders, he will be required, at his own expense, to fill the excess of excavation with such material as the engineer may direct.

Concrete formations shall be placed under the man-holes when so directed by the engineer.

CEMENT MORTAR.

The cement mortar for man-holes, lamp-holes and concrete shall be made of best quality of fresh ground Rosendale cement and clean, sharp sand, in the proportion of one measure of cement to two of sand. The sand and cement shall be thoroughly mixed dry, and such quantity of water added so as to form a paste of the proper consistency. All mortar to be fresh for the work in hand. No mortar that has begun to set will be allowed to be used.

CONCRETE.

The concrete used on the work shall be made of stone, broken so as to pass through a two-inch ring, and cement mortar. The stone shall be free from dirt. The cement, sand and stone shall be mixed in the proportion of one of cement, two of sand and two of stone.

MAN-HOLES.

The man-holes shall be constructed of hard brick laid in cement mortar. The thickness of the wall shall be ten inches.

The man-holes shall be elliptical in cross section at the bottom four feet long and three feet wide inside measurement at the top of sewer pipe, to be afterward drawn into a circle of two feet radius at the top, which shall be ten inches below the surface of the street. The brick work to be surmounted with a cast-iron top and cover, such as are now used in the city of Elmira.

The man-holes shall rest on a plank foundation of two inches thickness, the top of said foundation to be eight inches below the bottom of the sewer. Sound hemlock plank to be used for said foundation. An eight-inch arch of brick shall be turned over all pipes entering a man-hole. The man-hole shall be constructed as

the sewer is laid, except the filling in of the inside bottom of the sewer through the man-hole. This shall be put in all man-holes before the connection is made with the existing sewer on Reformatory street, as they may be needed as settling basins, or for the better pumping of water from the sewer during construction. The engineer reserves the right of altering the shape of the man-holes at the bottom. The bottom of the man-holes shall be laid in brick and cement mortar to the height of the top of the sewer pipe, the channel through said bottom being made to conform to the size of the pipes. At the discretion of the engineer, iron steps shall be put in the wall of the man-holes. Said steps to be made of three-fourths round iron, with two angles. Said step when in to project three inches into the man-hole, and to be twelve inches long. Said steps to be sixteen inches apart vertically. Said man-hole top, covers and steps can be obtained in Elmira for $10, or less, per man-hole. The top of said man-hole covers to be set at the present grade of the streets.

MATERIALS TO BE USED IN THE CONSTRUCTION OF BRICK MASONRY.

In the construction of the brick masonry, none but the best quality of whole bricks, burnt hard entirely through, shall be used, which are to be thoroughly wet immediately before being laid. Every brick is required to have full cement joints under bottom, sides and ends, which, for each brick, is to be formed at one operation, and in no case is it to be made by working in the cement after the brick is laid. The bricks to be culled as they are brought upon the ground, and all bricks of an improper quality immediately removed from the same.

MATERIALS — HOW FURNISHED.

All pipes and other materials shall be furnished by the contractor.

MATERIALS TO BE INSPECTED BY ENGINEER.

No materials of any kind shall be used in the construction of the sewers until they have been examined and approved by the engineer.

VARY WORK.

The work shall be carried on in such portions as the engineer shall direct, and he shall have power also to vary, extend or diminish the quantity of work, during its progress, without vitiating the contract; but no parts of the works shall be altered by the contractor from that shown on the drawings, or described in the specifications, without the express sanction of the engineer in writing. The engineer shall also fix the price to be paid for all work that may be necessary to be done that is not included in the contract.

FREEZING WEATHER.

No pipes or masonry will be allowed to be laid in freezing weather.

DISORDERLY OR INCOMPETENT WORKMEN.

If any person employed by the contractor on the work shall appear to the engineer to be incompetent or disorderly, he shall, on the requisition of the engineer, be immediately discharged, and such person shall not be again employed upon the work without the permission of the engineer.

OMISSION IN SPECIFICATION.

Should any work be accidentally omitted therein, which may be fairly implied as included in the contract, of which the engineer shall judge, the same shall be executed at the expense of the contractor.

LENGTH OF SEWER.

The length of the sewer will be measured on the center line of the pipe.

Should any delay occur during the construction on said sewer, owing to the non-delivery of sewer pipe or other material, the contractor shall pay the engineer during such delay his regular pay and expenses, such pay to be deducted from moneys due the contractor at the completion of the work.

INTERPRETATION OF TERMS.

Wherever the word "engineer" is used, it shall be held to mean the engineer in charge of the sewers, or his authorized assistant.

Wherever the word "contractor" is used, it shall be held to mean either any contractor or firm of contractors, or any member of a firm contracting for work herein specified.

Bids shall state the price per lineal foot of pipes of each size laid as herein specified, which price shall be in full for all labor and materials required for the complete execution of the work; also the price for each man-hole complete.

O. S. WILSON, *C. E.*

At a meeting of the State Board of Health, on the 24th of September, the above report was presented, and on motion was adopted by the Board, its recommendation approved, and a copy ordered transmitted to the Superintendent of Public Works.

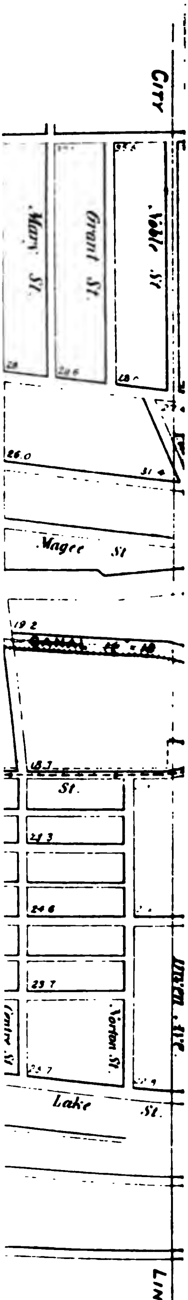
ALFRED L. CARROLL, M. D.,
Secretary.

The following documents show the appearance for an unforeseen nuisance, and method of remedy:

OFFICE OF THE BOARD OF HEALTH,
ELMIRA, N. Y., *January* 7, 1886.

Dr. ALFRED L. CARROLL, *State Board of Health, Albany, N. Y.:*

DEAR SIR — At a special meeting of the board of health of this city, held to-day, the following resolutions were unanimously adopted:



nearly half a mile long, the water standing in this prism at a level

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adopted :

Resolved, That it is the judgment of this board that the pollution of the wells from the contents of the Reformatory sewer, and the existence of gas in public school No. 4, in the Seventh ward, and in quite a large number of dwelling-houses, stores and buildings, all proceeding from the washing of oil gas at the New York State Reformatory, is detrimental to public health, and should be *immediately corrected.*

Resolved, That a communication be addressed to the State Board of Health, setting forth briefly the state of facts relative to the escape of gas and other contents from the State sewer in the seventh ward, and the said Board use means without delay to investigate the alleged nuisance before the public health is further endangered thereby.

Resolved, That the Secretary be instructed to transmit the above to the State Board of Health with a brief explanation of the existing circumstances.

In way of explanation I would respectfully add: The Elmira board of health to-day visited a large number of dwellings and stores along the line of the sewer. In several places the escape of gas from the sewer has made the places almost uninhabitable. A large number of wells have been affected by the sewer, and in many instances the people residing near by have been left entirely without water that is fit for use. The water was found to be tainted at a distance of over 300 feet from the sewer. A large public school building has the gas in extensive amounts, and the complaints from citizens are growing numerous and vehement. It appears evident that the damage will be extensive if some immediate remedy is not found.

Yours very respectfully,
EDSON C. GEORGE,
Secretary of Elmira Board of Health.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography.

The Secretary has referred to me a communication from the board of health of the city of Elmira, complaining that the new Reformatory sewer recently built, and originally planned in accordance with the advice of the State Board of Health, has created a nuisance in the northern part of Elmira, by causing the escape of gas into the cellars of a public school and a number of other buildings.

The gas mentioned is said to be produced from the washing of oil gas at the New York State Reformatory. I have already through an inspector been informed of the conditions attending this escape of gas. The facts concerning this Elmira sewer are briefly these:

On complaint of the city authorities at Elmira in the summer of 1884 the prism of the abandoned Chemung canal running through that city was examined and found to be practically an open cess-pool nearly half a mile long, the water standing in this prism at a level

with the ground water of the surrounding tracts. The pollution of this water in the abandoned canal prism was endangering the health of the city in two ways; first, by the contamination of the air, and secondly, by the fact that it polluted the ground water which flowed through the loose soil of the northern part of Elmira. This pollution of the ground water doubtless affected the ground air, and so both the ground water and the ground air which reached the cellars and the wells were endangered by the canal prism.

The principal cause of the contamination of a long section of the canal prism was the leaking of the Reformatory sewer which was open at every joint, and laid so near the surface of the ground that it was impracticable to keep it in proper condition. After carefully considering all the circumstances, I found that in order to construct a proper sewer it would be necessary to change the route and lay the sewer in one of the public streets of Elmira, giving it outlet into the city sewer system. I so recommended to your committee.

In accordance with these recommendations, the then existing condition of the Chemung canal prism was declared to be a dangerous nuisance, and it was recommended that provisions should be made by the State for laying a proper sewer in one of the public streets of Elmira, where it would always be accessible for examination and repair, and where it could be covered with not less than five feet of earth. The last Legislature made appropriation for this work with the proviso that it should not be executed without the consent of the city of Elmira, and unless it would undertake, when the work was completed, the future maintenance of the sewer, which should then become city property, but through this sewer the Elmira Reformatory should always have the privilege of disposing of its sewage.

During the early part of the summer of 1885, the common council of Elmira passed an ordinance prescribing the route which should be followed by this sewer, and the method of its construction. They declared that it must be built of cement pipe, in accordance with the method followed in the other city sewers. They appointed the assistant city engineer inspector of the work, to see that the wishes of the city were thoroughly carried out.

The sewer was constructed on the route laid down by the city of Elmira, and in the way described in the city ordinance, under the direction of the Superintendent of Public Works of the State. The assistant city engineer, appointed by the mayor, inspected the work and declared on its completion that it was properly done. Mr. O. S. Wilson was the engineer in charge for the Superintendent of Public Works.

The work was done under contract, and from the efficiency of the double supervision I think there is every reason to believe that there is no better cement pipe sewer in Elmira. Where the sewer joins the city system it is below the level of the ground water. As it goes northward it rises gradually above the level of the subsoil waters, and in the region where the gas nuisance is complained of, it enters a soil composed of coarse dry gravel containing almost no

loam or clay. Through this coarse gravel the air circulates as freely as thrcugh a heap of stones. The surface of the ground is now frozen. The strong odors of the gas waste escape through the joints of the sewer, and finding no outlet through the frozen surface, are drawn through the currents of ground air toward the cellars of heated houses and the wells, which form the chimneys for the escape of the ground air.

The odors of this gas waste is almost as permeating as that of the oil of peppermint. It easily penetrates two or three hundred feet through the dry gravel, and doubtless is an offensive nuisance in the district from which the complaint comes.

The fault in this matter cannot be laid to the construction of the sewer. No cement pipe sewers are air-tight, nor do they even approximate to such a condition. Where these sewers are laid in a clay or other compact soil, the air from them does not penetrate into the soil to any great distance from the sewer, but where the soil is a coarse dry gravel it is not possible to prevent the air from escaping from cement pipe sewers, and going wherever the underground currents traverse the soil.

In the case of the Elmira sewer there is but one means of remedying the offensive nuisance complained of, and that is to keep the gas refuse out of it.

I do not believe it practicable to so ventilate this sewer as to prevent the odor from the gas wastes from penetrating the soil and affecting the ground water and the ground air, especially in winter when the surface is frozen, and when the currents of ground air necessarily set strongly toward both cellars and wells, nor do I think it practicable to build an *air-tight* cement pipe sewer in this coarse, gravelly soil.

There is no reason to suppose that this sewer is not one of the best of its kind, but from the fact of its traversing this coarse and peculiarly porous soil above the level of the ground water it is evident that it will not answer for the disposal of the gas wastes. I recommend that these facts be set before the board of health of the city of Elmira, and the authorities of the Elmira Reformatory, with the hope that they may agree upon a method of gas waste disposal which will cause no nuisance to the city of Elmira.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

At a special meeting of the State Board of Health, held on the 14th of January, 1886, the drainage committee submitted the above report of Consulting Engineer Gardiner, and recommended its adoption.

On motion, it was

Resolved, That the report and recommendations of the Consulting Engineer on the State Reformatory sewer at Elmira be and hereby are approved and adopted.

Resolved, That copies be sent to the board of health of the city of Elmira, and to the superintendent of the Elmira Reformatory.

ALFRED L. CARROLL, M. D.,
January 15, 1886. *Secretary*.

THE DRAINAGE OF THE PRISM OF THE ABANDONED CHEMUNG CANAL BETWEEN THE VILLAGES OF NORTH ELMIRA AND PINE VALLEY.

The committee herewith report to the Board the plan recommended in the annexed report of Consulting Engineer James T. Gardiner, and recommend its adoption and approval, the work to be executed by the Superintendent of Public Works under chapter 470 of the Laws of 1885.

ERASTUS BROOKS, *Chairman*.
GEORGE W. COOKE.
E. M. MOORE, *President*.
ALFRED L. CARROLL, *Secretary*.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with the direction of the committee, I examined, on September 16, that part of the abandoned Chemung canal which lies between the villages of Pine Valley and North Elmira to determine upon a plan for the drainage of this part of the abandoned canal. A survey of this locality had been executed by Mr. Wilson for the State Board of Health in 1884. From the data furnished by this survey, it appears that there are two feasible methods of draining that part of the canal prism which is now a swamp. The cheapest method, however, and that most likely to be permanent in its results, is undoubtedly to ditch the center of the prism from the town line of Veteran and Horseheads down to a point designated on Mr. Wilson's map as being just north of the land owned by Peter Adams. At this point a cut is made from the canal prism to the creek. A ditch already exists from this cut for several thousand feet to the southward. It is not thoroughly operative for the reason that the outfall into the creek is not sufficiently low, owing to the elevation of the surface water in the creek, nor is the ditch of sufficient width or proper grade.

After carefully examining the various possibilities I recommend that from the land of Peter Adams to that of John Dilmore near lock No. 44 the bed of the creek be so cleaned out as to lower the water surface at least two feet at the north line of Peter Adams' property; that the present outfall ditch from the canal into the creek be so enlarged and graded as to form a permanent outfall for the drainage of the abandoned canal; that from this outfall, which is situated on the land marked on Mr. Wilson's map as belonging to John Banks, near the southern line of his property, a ditch two feet wide on the bottom be excavated in the center of the canal prism to the town line of Veteran and Horseheads, where the bottom

of the ditch should be four feet below the present water surface. From this point the ditch should have a uniform fall to the outlet. South of this point the canal prism should be ditched as far south as the means provided will allow, and with such fall as the grade permits.

The cleaning out of the creek bottom from the outlet of the canal ditch down to lock No. 44, and the improvement of the channel should be such as to permanently lower the water at least two feet. I feel quite confident that this plan, if properly executed, will afford permanent relief to this region and result in the reclamation of a large amount of valuable land adjoining the canal.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

At a meeting of the State Board of Health on September 24, at Albany, the above report was presented, and on motion was adopted by the Board, its recommendations approved, and a copy ordered transmitted to the Superintendent of Public Works.

ALFRED L. CARROLL, M. D.,
Secretary.

The following documents show a modification of plans, and the reasons therefor:

ALBANY, *January* 4, 1885.

Hon. ERASTUS BROOKS, *Chairman Committee on Drainage, Sewerage and Topography:*

DEAR SIR — I have the honor to recommend that the plans for the drainage of the prism of the abandoned Chemung canal in Pine Valley be modified as follows: Instead of giving outlet to the drainage ditch down the center of the canal into the creek about a mile above the lock, as originally intended, I recommend that the ditch be carried on down the center of the canal to a point not far above the lock where a cut has already been made from the canal to the creek, and that this be made the outlet for the drainage of the canal prism. All other connections between the canal and the creek above should be closed. The ditch should have such slopes as will maintain themselves in the different material traversed.

As respects the work at Havana, I recommend that the culvert under Ayers street be made large enough to carry off water which overflows from the creek in time of flood, and that the pipe drain laid in the bed of the canal be extended up to the dive culvert, there to receive the surface drainage from the prism above. I recommend that the prism above the dive culvert be drained by a a surface ditch rather than by subsoil drains, as at first proposed. This change is made on account of Mr. Wilson's report that the quicksands under the canal bed would soon fill up the subsoil drains.

As this matter was referred by the Board to the committee with

power, and as the Superintendent of Public Works is anxious proceed at once to complete the work, will you, if you approve recommendation, kindly return this letter with an indorsement t the modifications of the plans are adopted?

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer

The question of modifying the plans for the drainage of prism of the abandoned Chemung canal having been referred, w power, to the committee on drainage, sewerage and topography, above recommendations of Mr. Gardiner have been approved that committee.

ERASTUS BROOKS, *Chairman.*
GEORGE W. COOKE.
E. M. MOORE, *President.*
ALFRED L. CARROLL, *Secretary*

At a special meeting of the State Board of Health on the 1 January, 1886, the above report of the drainage committee approved and adopted.

ALFRED L. CARROLL, M. D.,
Secretary

January 15, 1886.

REPORT CONCERNING COMPLAINT FROM THE TOWNSHIP OF FLORI MONTGOMERY COUNTY.

To the Secretary of the State Board of Health:

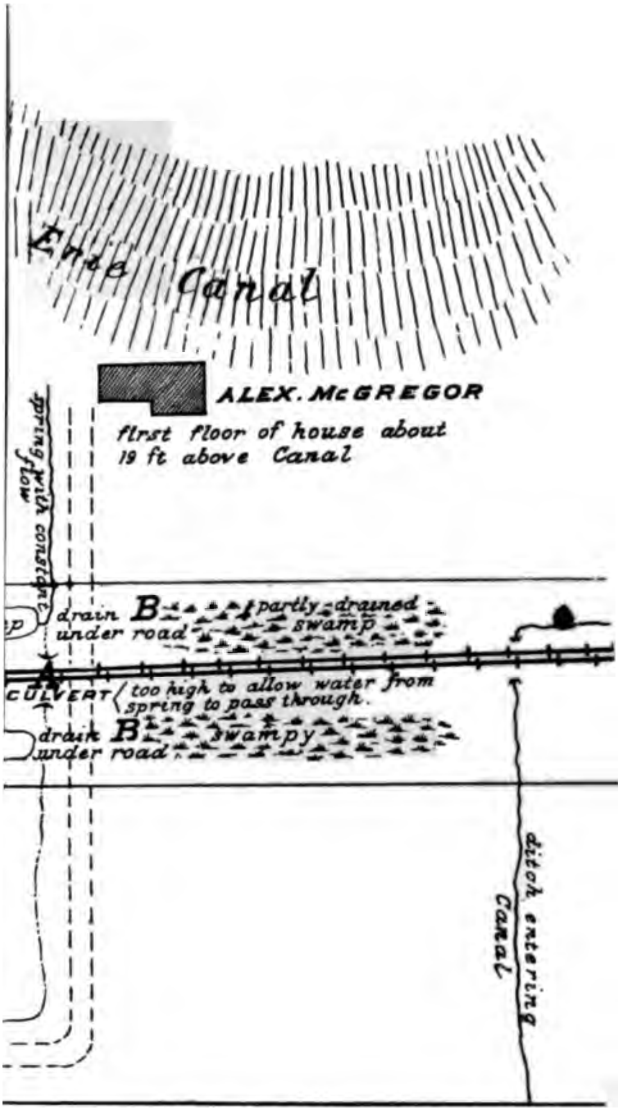
SIR — In accordance with your instructions I have examined conditions that have been the occasion of complaint, in the towns of Florida, Montgomery county, and herewith present my rep

The pools of stagnant water described in the complaint l received recently a large amount of rain-water, hence they w somewhat improved in appearance, otherwise the conditions appea to be as described in the complaint.

The house of Mr. Alex. McGregor, the petitioner, is situated u the south side of the Erie canal and about 360 feet from it. T land slopes gently to the north, and formerly was effectually drai by a ditch running parallel to the canal and passing under the la by means of a culvert about 700 feet east of Mr. McGregor's hou When the New York, West Shore and Buffalo railroad was built embankment ten or twelve feet in height was constructed about feet north of the house and between it and the canal.

Ditches were indeed dug on each side of the embankment w the design of leading off the water, but these are very shallow accomplish this object very imperfectly.

Mr. E. H. Putnam, a surveyor, has found the level of the wa in the ditch nearest the house to be two and a half feet higher t in the ditch nearest the canal; the level of the water surface in



E ABOUT 100 FT. TO 1 INCH.

AUGUST 29TH 1885.

HORACE ANDREWS, JR. C.E.
del.

latter ditch was very nearly the same as in the canal at the time of my visit.

The evidence is very clear, therefore, that the railroad embankment has caused the level of the ground water in the immediate vicinity of Mr. McGregor's house to be considerably raised; moreover the water being held from flowing off varies slightly in level from time to time as it is evaporated, or augmented by rains, so that the conditions seem favorable for the malarious complaints that exist.

In the present instance there would seem little difficulty in thoroughly draining the ditches according to the plans suggested by the surveyor, Mr. E. H. Putnam. Care should be taken that the ditches are of sufficient depth to accomplish their object, and after being dug they should be kept clean. The drain-pipes designed to lead the water under the roadway leading to Mr. McGregor's house are too high and should be lowered considerably, otherwise the land lying immediately in front of the house can receive no benefit from an increased depth of ditching.

The accompanying sketch illustrates the conditions described in this report.

Very respectfully yours,
HORACE ANDREWS, JR.,
Civil Engineer.

ALBANY, *August* 29, 1885.

LATER REPORT ON THE SAME SUBJECT.

To the Secretary of the State Board of Health:

SIR — In accordance with your instructions I have again examined the ditches in the vicinity of the house of Alex. McGregor, in the township of Florida, Montgomery county. My first examination of the nuisance in question was made on August 28, 1885, and I shortly after submitted a report to you. In accordance with recommendations then made, the local board of health obtained from the New York, West Shore and Buffalo railroad a promise that the matter would receive attention.

Upon the occasion of my second visit, on November 10, 1885, I found that the railroad company had taken steps to remedy the evils complained of, and had promised to complete the work as soon as practicable. There is no doubt that the nuisance could have been effectually abated within a few days, by more prompt action on the part of the railroad officials.

Owing to the recent heavy falls of rain and the lateness of the season, the work required cannot now be prosecuted without considerable inconvenience, while the conditions at present existing can hardly be detrimental to health during the winter months.

It would, therefore, appear that the assurances of the local board of health that attention will be directed to the nuisance early in the spring, and that the recommendations of your Board will then be promptly and thoroughly carried out, should be accepted, and the

railroad company may properly be allowed to wait till the winter is past before completing the needed improvements.

It would be advisable for the railroad company to commence their operations by taking the necessary levels and completing the outlet ditches first, in order of time, after which the wide ditches could be filled to the former level of the land with advantage, thus avoiding the necessity of any deep ditching at the outlets.

Very respectfully yours,

HORACE ANDREWS, JR.,
Civil Engineer.

ALBANY, *November* 11, 1885.

PLAN FOR THE DRAINAGE OF THE ABANDONED CHEMUNG CANAL IN THE VILLAGE OF HAVANA.

The committee herewith submits to the Board the plan approved by Consulting Engineer James T. Gardiner, for the drainage of the prism of the abandoned Chemung canal in the village of Havana, the drainage of which is, by chapter 470 of the Laws of 1885, to be done by the Superintendent of Public Works, under the advice and direction of the State Board of Health.

The committee approves the plan of Consulting Engineer Gardiner, and recommends its adoption by the Board.

ERASTUS BROOKS, *Chairman*,
GEORGE W. COOKE,
E. M. MOORE, *President*,
ALFRED L. CARROLL, *Secretary*,
Committee.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography.

GENTLEMEN — In accordance with your directions I visited the village of Havana on the 16th of September, to determine on a plan for the drainage of the prism of the abandoned Chemung canal, in the village of Havana, in order that the Board might approve of a plan to be carried out by the Superintendent of Public Works, in accordance with chapter 470 of the Laws of 1885.

In January last, this village had been visited and examined by O. S. Wilson, C. E., acting for the State Board of Health, and on his examination, the State Board of Health, on the 17th of February, 1885, declared that the condition of the prism of the abandoned canal in Havana was a nuisance, and recommended its drainage substantially in accordance with the plan then submitted by Mr. Wilson.

I examined the ground, and fully concur in the conclusion reached by Mr. Wilson that a part of the canal prism, especially that lying south of South street, is a nuisance, dangerous to life and detrimental to health.

From this point southward for a distance of some 2,400 feet, the

prism of the canal is excavated below the level of the ground water, and the water which fills this part of the canal is, therefore, not surface water, which is drained into it, but sub-soil water which stands at this level. The rapid growth and decay of a large amount of vegetation in this water, the surface of which fluctuates with the ground water, produces conditions most favorable to the development of malarial disease. This condition can only be remedied by filling the prism to a height several feet above the level of the ground water, or by draining; that is by such drainage as will lower the surface of the ground water below the bed of the canal. The latter course, that of drainage, is decidedly the cheaper, and has the added advantage, from a sanitary point of view, of providing for the storm water that will naturally accumulate in such a depression at certain seasons. The lowering of the ground water of this part of the village will doubtless be a benefit to the health of the people.

This sub-soil drainage of the part of the prism to the south of South street can best be accomplished by laying two lines of agricultural drain tile along the bed of the canal. The tile should be of a diameter of six inches. To give outfall to these drains it will be necessary to lay a drain from South street to the south end of Lock No. 1, a distance of some two thousand feet, and then to run a culvert, which may be also of drain pipe, under Ayres street. The drain from South street to Lock No. 1 should be of best salt glazed vitrified pipe, twelve inches in diameter. The culvert under Ayres street should be eighteen inches in diameter. A catch basin should be placed at the junction of the sub-soil drains and the main outfall drain just south of South street, with the bottom of the man-hole below the level of the drain for catching any silt that may come down.

Mr. Wilson's original plan provided for the carrying of a twelve-inch drain through to the water on the south side of Ayres street, and for the filling of Lock No. 1; but this does not seem to me necessary, as the lock itself is considered a proper outfall for the water. A good current will be created through it by the admission of the water from the drain at its south end, while at its north end a large culvert will connect it with the old canal prism, which has now become as it were a branch of the lake.

The use of the lock as an outfall will considerably reduce the cost of the work. The fall from South street to Lock No. 1 provided for in his plan, a map of which I append, is ample. It is about one foot in a thousand. I, therefore, recommend for the approval of the committee the plan submitted by Mr. Wilson with the modification that the outlet should be into Lock No. 1 rather than into the canal at the north side of Ayres street, and that a culvert be placed under Ayres street, and that the lock excavation be left open.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

At a meeting of the State Board of Health on the 24th of September, the above report was presented, and on motion was adopted by the Board and its recommendations approved, and a copy ordered transmitted to the Superintendent of Public Works.

ALFRED L. CARROLL, M. D.,
Secretary.

DRAINAGE OF A SWAMP IN THE TOWN OF WESTCHESTER, NEAR CLASON'S POINT.

A petition having been received from property-owners in the town of Westchester, and the president of the trustees of the school district interested, asking for an investigation into the condition of a tract of marsh between the estate of William Watson and Clason's Point, which it is alleged is affecting the public health, Consulting Engineer James T. Gardiner was directed to examine into the matter and report to the committee. His report, which is approved, is hereto appended. In accordance with the suggestions we recommend that the Board declare the condition of the tract of marsh crossed by the highway, and lying between the estate of William Watson and Clason's Point, to be a nuisance, and recommend the drainage of the tract under a commission appointed by the court, in accordance with the provisions of the general drainage law, chapter 888 of the Laws of 1869, and the amendments thereof.

ERASTUS BROOKS, *Chairman,*
GEO. W. COOKE,
E. M. MOORE, *President,*
ALFRED L. CARROLL, *Secretary,*
Committee.

Consulting Engineer's Report.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with your directions I visited the town of Westchester to examine a large piece of marsh land lying between the estate of William Watson and Clason's Point.

The piece of marsh of which complaint is made to the State Board of Health is crossed by the main road between the estate of William Watson and Clason's Point. The road crosses the marsh on a causeway. There are said to be some hundreds of acres here which are now so flooded at high tide that the land is kept continually saturated. My visit was made at about low tide, for the purpose of seeing the swamp in its worst condition. The rapid growth and decay of vegetation has caused such a deposit of decomposing matter that a very offensive odor is perceived at the road even in cool weather. This condition of things is alleged to be of comparatively recent origin. Some distance below the road at the southern edge of the swamp two rocky promontories come out from either side, quite close to the stream which drains the central part of the marsh.

Here a short dam or dyke has been constructed crossing the marsh. Formerly a tidal gate was maintained by the town which was said to be effective in keeping back the flood tides so that the marsh was rarely submerged. The surface of the marsh was so far above the low tide line as to drain itself if not constantly saturated. It is said that when the flow of the tide was kept out by the tidal gate, the surface of the marsh was drained and was covered with a fine growth of grass which the owners were in the habit of mowing. Certainly if this is the case the former condition was far more sanitary than that which exists at the present time; for there can be no doubt that the present condition of the marsh is liable to affect the health of those living or coming within the reach of its miasmatic influences. A public school has recently been erected quite close to the swamp, and I see that the president of the board of school trustees is one of the complainants in this matter.

No one familiar with sanitary investigation can doubt that the present condition of the swamp is a nuisance and that its drainage and reclamation to such an extent as to convert it into a meadow would be a material advantage to the public health; and it would further seem that the method formerly practiced of keeping out the flood tides by the tidal gates, while letting the waters of the swamp flow out at low tide, would be an efficient remedy for much of the present evil, provided that in connection with such work the swamp was thoroughly ditched as it was said to have been formerly.

It is said that the town became tired of maintaining the tidal gate at the mouth of this swamp under the impression that the main benefits accruing were enjoyed by the owners of the land reclaimed and not by the township at large.

It is true that the owners of the swamp and the owners of the land immediately adjoining the swamp were probably very largely benefited by the tidal gate, but the township at large was also benefited in the matter by the condition of the highway or causeway crossing the swamp. This causeway is now flooded at very high tides, and the road upon it damaged. It also appeared to me that owing to the saturation or softening of the swamp the causeway was in places settling into the muck. It is probable, therefore, that the drainage of the swamp would make the repairs upon the road less costly; but in addition to this there would be a benefit to the health of the people of the neighborhood, to the children attending school, and also a benefit by the removal of the danger which now exists in greater or less degree to the health of persons constantly traversing the highway.

It, therefore, appears that the benefits of the reclamation of this swamp would be enjoyed both by the town at large and by the owners of the swamp and adjacent property. Since the benefits are thus distributed it would be equitable that the cost of constructing and maintaining this work should be distributed between the town and the private owners in proportion to the benefits received.

It would seem probable that the execution of the work and the

distributions of the cost of this drainage could best be accomplished by a commission appointed by the court under the General Drainage Act. I, therefore, recommend that the Board declare the present condition of the marsh in the town of Westchester between the property of the estate of William Watson and Clason's Point a nuisance, and recommend that its drainage be secured by those interested by an appeal to the courts under the General Drainage Act, chapter 888 of the Laws of 1869, and its amendments.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

At a meeting of the State Board of Health on 24th of September, at Albany, the above report was presented, and on motion was adopted by the Board, its recommendations approved, and the swamp in question was declared to be a nuisance and its drainage recommended, as set forth in the report.

ALFRED L. CARROLL, M. D.,
Secretary.

ALBANY, *October* 2, 1885.

To F. A. WATSON *and others, petitioners,* 99 *Franklin St., New York City:*

GENTLEMEN — In response to your petition, examination has been made of the swamp between the property of William Watson and Clason's Point, and the result of such examination with recommendations for remedying have been reported to the Board and approved by it. A copy of the report and recommendations so approved is herewith inclosed with the hope that you will be successful in securing the abatement of the nuisance by the methods suggested.

Very respectfully yours.

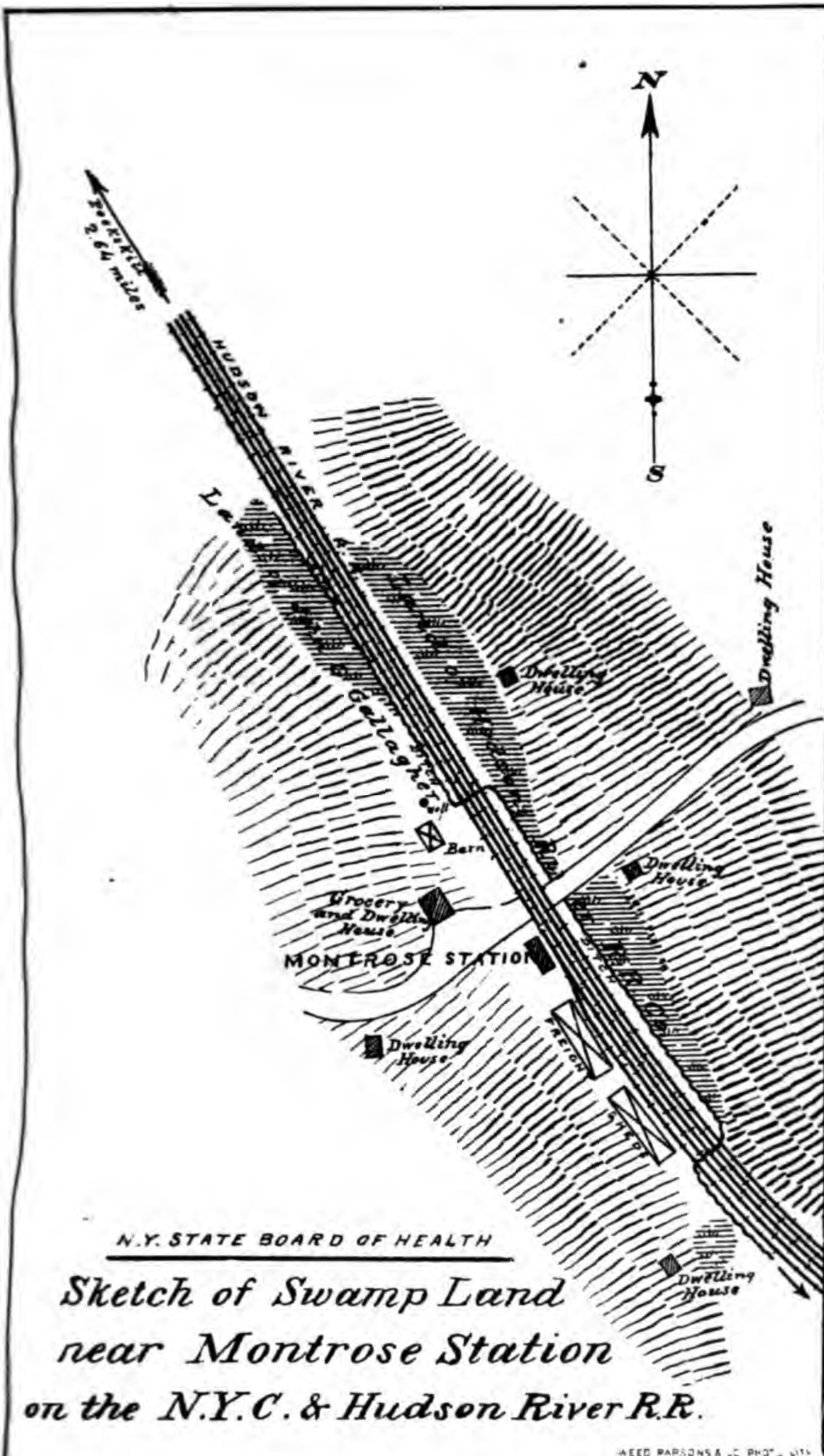
ALFRED L. CARROLL, M. D.,
Secretary.

REPORT UPON A NUISANCE OCCASIONED BY SWAMP LANDS AT MONTROSE STATION, WESTCHESTER COUNTY.

To the Secretary of the State Board of Health:

SIR — In accordance with instructions received from the State Board of Health, I have examined into the causes of complaint that have recently been the subject of communication to the State Board of Health, on the part of the local board of health of the township of Cortlandt, Westchester county. My report relative to the complaint is herewith submitted:

In the immediate vicinity of Montrose Station, on the New York Central and Hudson River railroad, the railroad passes through a small swamp lying between rocky hills. This swamp is said to have



N.Y. STATE BOARD OF HEALTH

Sketch of Swamp Land near Montrose Station on the N.Y.C. & Hudson River R.R.

occasioned trouble by causing a settling of the track, the indications being, therefore, that it is of some depth.

That part of the swamp lying to the east of the railroad, and covering perhaps a little over an acre, is said to be the property of the railroad company, while the portion on the west side of the railroad, covering about three-quarters of an acre, is owned by John G. Gallagher.

The swamp land is partly drained by a ditch running along the railroad tracks, and crossing them twice through open sluice-ways, with wooden sides. Neither the ditches or sluice-ways are of sufficient depth to drain the swamps with any degree of thoroughness, but they probably remove the large accumulations of water in spring and during heavy rains.

Swamps of the character of the one mentioned are quite common in the neighborhood, and it is the testimony of the health officer that malarious complaints, which are widely prevalent, are often attributed to the exhalations from the swamps. The conviction that these wet and marshy lands are naturally the causes of malaria is strengthened by the fact that there was formerly a large swamp near Verplanck's Point, in the near neighborhood, which has been converted into a pond by damming, and malarious complaints which were general near its borders have nearly ceased since the land has been entirely flooded.

Within four or five hundred feet of the swamps at Montrose Station there are at least six dwelling-houses, with from twenty to thirty inmates; it was stated by the health officer that malarious complaints had been known to occur in all of these houses, and that their proximity to the wet lands was supposed to be the cause of the illness.

It may be fairly assumed, therefore, that the swamps in question are a nuisance, and in their present condition are detrimental to the public health. By deepening the ditches and sluice-ways to a suitable extent, or by partly filling the swamps, it is probable that complaints of a malarious nature will be less frequent. It would, therefore, seem proper for those interested to take such steps as may be necessary, acting under the general drainage law of the State, to secure the thorough drainage or reclamation of the swamps that are the subject of complaint.

Very respectfully yours,

HORACE ANDREWS, JR., *C. E.*

ALBANY, *May* 5, 1885.

ALBANY, *August* 20, 1885.

To the President of the Board of Health, Rhinebeck, N. Y.:

SIR — The accompanying petition, signed by a number of residents of your village, is received at this office. To permit the renewal of a nuisance officially condemned and ordered to be abated but two years ago, as shown by the records of your board, is a

procedure calculated to bring discredit upon sanitary administration, and, if the facts be as represented by the petitioners, to endanger the health of your village, where soil saturation has long been a serious evil.

You are, therefore, requested, under the provisions of section 3 of chapter 270 of the Laws of 1885, to convene your board forthwith, and take measures to prevent the flooding of land which has been drained expressly for sanitary reasons.

ALFRED L. CARROLL, M. D.,
Secretary.

To the Board of Health of the State of New York:

We, the undersigned residents of the village of Rhinebeck, respectfully petition the Board of Health of the State of New York to take notice of and prohibit the creation of a nuisance and an injury to the health of this village and town, to-wit:

That on or about the 8th day of May, 1883, the board of health of the village of Rhinebeck, having, on the petition of a number of the inhabitants, investigated the condition of the property known as the mill-pond, passed the following resolution:

"*Resolved*, That the health officer be directed to serve on Mrs. Alice Huntington, the owner thereof, an order requiring her to effectually remove the mill-dam within thirty days from the receipt thereof, and to ditch and drain the marshy places as soon as practicable."

That in pursuance of said order, given under said resolution, the owner of said dam removed the same and caused the said marshy places to be ditched and drained in conjunction with another owner of land, formerly covered by water.

That the present board of health of this village have given permission to the owner of an ice-house, adjoining this land, to erect a dam, and that said intended dam is about being erected.

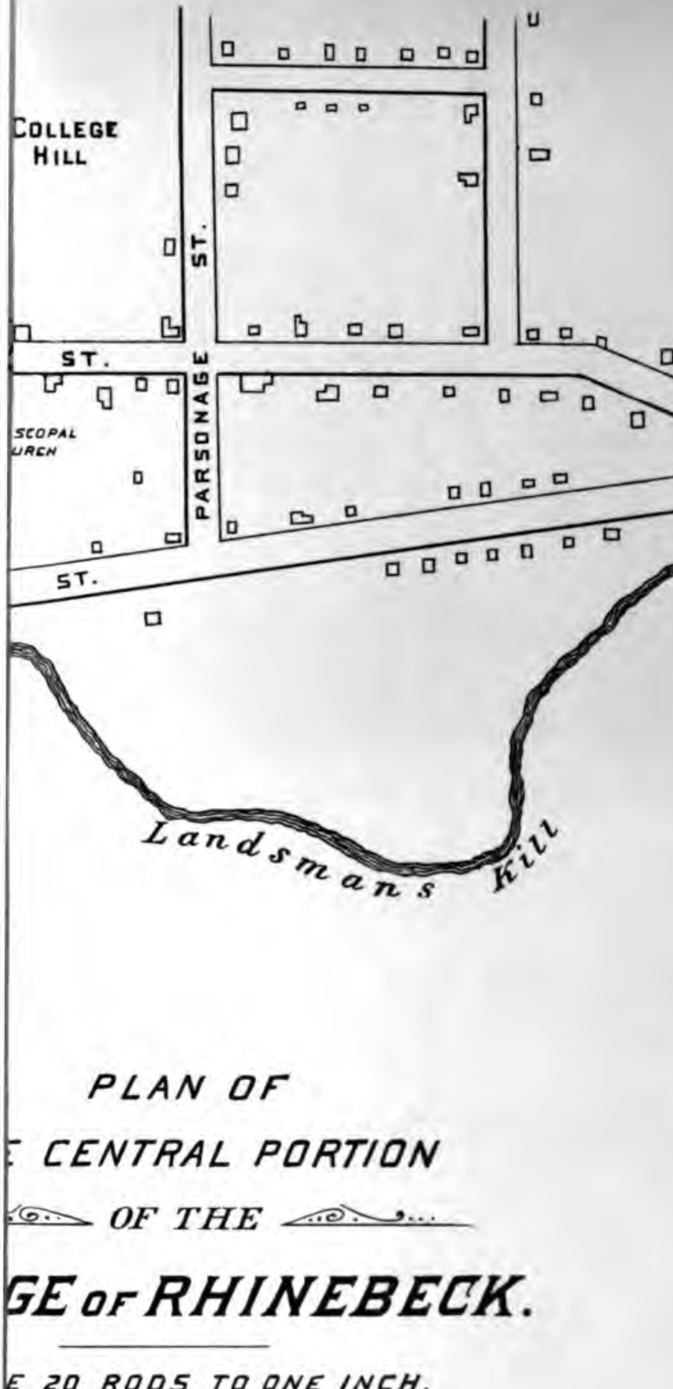
That said dam will restore the nuisance that formerly existed and be detrimental to the health of our citizens. We, therefore, pray that your honorable Board will investigate and examine into our complaint, and give such order and direction that to your Board may seem just and proper.

Dated RHINEBECK, *August* 19, 1885.

ALBANY, *September* 10, 1885.

F. M. SMITH, Esq., *President of the Board of Health, Rhinebeck, N. Y.:*

DEAR SIR — I transmit, for your information, a copy of a report on the condition of the old mill-pond by Inspector Andrews, who corroborates the conclusions of your board as regards the precautions to be observed in the reconstruction and maintenance of the dam, and whose recommendations will be of practical service in carrying out the resolutions which you have wisely adopted.


COLLEGE HILL
ST.
PARSONAGE ST.
ST.
SCOPAL
URCH
ST.
Landsmans Kill
PLAN OF
CENTRAL PORTION
OF THE
GE OF RHINEBECK.
E 20 RODS TO ONE INCH.

The greatest danger to health undoubtedly arises from the alternate flooding and exposure of land so situated, and it is to be hoped that your prohibition against drawing down the water will be rigorously sustained. With a minimum influx of nearly 200,000 gallons *per diem*, it seems evident that by following the suggestions of Mr. Andrews the pond can be kept at a nearly permanent level in all seasons and serious peril thereby avoided.

Faithfully yours,

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT CONCERNING THE OLD MILL-POND AT RHINEBECK, DUTCHESS COUNTY.

To the Secretary of the State Board of Health:

SIR — In accordance with your request, on the 7th of September, I made an examination of the swampy land covering the site of the old mill-pond, at Rhinebeck, Dutchess county, and herewith submit my report, with accompanying plan of a portion of the village of Rhinebeck.

A stream, called "Landsman's Kill," flowing through Rhinebeck, has a considerable water-shed and a somewhat rapid descent, so that at various available places it has been dammed for manufacturing purposes. At the present time, however, many of these water powers have been abandoned, although not from any insufficiency of water.

The old mill-pond in the village of Rhinebeck has been dry, except in the late fall, winter and spring, for a number of years, and its bed is now swampy and covered, for the most part, with a rank growth of weeds. The dam at this pond has now been re-erected in an apparently substantial manner, and it is proposed to again flood the land, as in former times.

The flow of "Landsman's Kill," at the time of my visit, was about ninety gallons per second, by a rough measurement, but, according to the testimony of residents, in times of drought it may be diminished to about one-quarter of this, or twenty-two and one-half gallons per second. In a pond, covering about six acres on the land of Mr. George Miller, several miles further up stream, on the day of my visit, the water was flowing rapidly over the crest of the dam for a width of nearly twenty-five feet and to the depth of three inches. It is stated that in the driest seasons the water still flows over the crest of the dam to the depth of one-half an inch on the entire length of coping.

The area of the mill-pond at Rhinebeck, when again flooded, would be, perhaps, four and a half acres, and the water would be quite shallow in places, not averaging over four or five feet in depth over the whole pond. It would, therefore, seem that Landsman's Kill supplies an abundance of water to keep the pond full, even in the driest weather, if it is not drawn down for manufactur-

ing purposes, and sufficient to renew the entire volume of water often enough to prevent stagnation.

It would be very difficult to drain the swampy land in the bed of the mill-pond, in an effective manner, without deepening the bed of the creek. As the creek flows over rock in places, such deepening would be very expensive. At present the old-mill pond would seem to be in a very bad condition for sanitary reasons; the land is alternately flooded and dried, and, as before stated, its thorough drainage would be a difficult task. The pond could be kept flooded to a very nearly uniform level with proper precautions. The width of coping at the overflow on the crest of the dam should be about twenty feet, and ample provision should be made for the escape of the waters of freshets over a much greater width of coping. If gates are left in the dam, to draw the water down when necessary, they should be well secured from being improperly used, and they should never be used except in a case of necessity, with the knowledge and consent of the board of health. It would be essential, moreover, that the water should not be drawn down for manufacturing purposes, but that only the overflow from the crest of the dam should be used.

Most of the vegetation growing on the old bed of the mill-pond could be cut down and burnt off before water was admitted, while that which would be left, being constantly submerged, would not be objectionable.

If either the entire flooding of the old bed of the mill-pond or its thorough drainage is to be attempted, the former would seem the more practicable, for the land can be kept submerged to a constant level with much greater ease than it can be drained.

Careful supervision would have to be exercised if a number of ditches were to be kept in good order over an area of several acres; while it would be at once apparent if the water were being improperly used so as to cause fluctuations of level in case the dam should be again maintained.

Very respectfully yours,

HORACE ANDREWS, JR., *C. E.*

ALBANY, *September* 9, 1885.

REPORT ON SANITARY MEASURES FOR GOUVERNEUR.

To the Committee on Drainage, Sewerage and Topography:

Appeal having been made by prominent citizens of Gouverneur to the State Board of Health to investigate the prevalence of diphtheria, which was claimed to be epidemic in that vicinity, Dr. F. C. Curtis of this Board visited Gouverneur on the 4th of December, and investigated the sanitary condition of the village, and the physical conditions which might have a bearing upon the health of the people. His report has been made to the sanitary committee and by it referred to the committee on drainage, sewerage and topography. Since it is evident from Dr. Curtis' report that the

question involved is one of drainage and water supply, Dr. Curtis' findings and the whole question have been referred to me. I had intended to make a personal examination of the ground, but after examining a map of the place and a topographical view brought by Dr. Curtis, and after consultation with him I find myself in possession of enough facts to warrant a conclusion as to the general outlines of the sanitary difficulties and of the remedies to be applied. A detailed statement of the methods for remedying the evils found is perhaps not necessary until the people decide that they will remove the insanitary conditions of the place. An examination for a detailed report, especially on the question of water supply, could not properly be made at this season of the year. The object of the present report will, therefore, be to point out the general character of the sanitary improvements needed, without undertaking to discuss the details of the plans.

REPORT.

Modern science has demonstrated beyond question that man's physical life is governed by laws, and that the breach of these laws is surely followed by consequences which, in themselves, are often a terrible punishment to the law breaker. The laws which govern man's life exist and work out their consequences regardless of what we think about them. We may believe or disbelieve their existence; we may shut our eyes and say that we will continue to do as our fathers did before us, and not recognize the discoveries of modern science and live on as if there were no sanitary laws; but many of us forget that these laws go on working out their direful consequences regardless of our belief or disbelief. The proper attitude of mind for all of us is to admit that our physical life is absolutely governed by laws, and carefully endeavor to find out what these laws are. Some have been discovered, some are partly understood, many are yet unknown.

Among those laws of life which may be considered to be absolutely known is the one which most affects the health of the people of Gouverneur, and this is the principle that *soil saturation, combined with filth under and around human dwellings, invariably affects in a serious manner the health of a large portion of the people exposed to such conditions.* This hygienic law has been proved by observation and statistics in so many localities and in so many countries that it is no longer open to discussion.

Accurate vital statistics taken in England before the drainage of cities and villages have been carefully compared with the statistics of disease taken after drainage works had been executed. The comparison invariably showed an enormous decrease in certain classes of disease, these being principally the zymotic diseases and consumption. In Massachusetts the careful researches of Dr. Bowditch demonstrated the serious effects of living over saturated soil in that State. In Gouverneur, Dr. Curtis found the sub-soil waters to be within two feet of the surface of the

ground through a large part of the village. Of course the cellars are damp or contain standing water in many places. This is quite similar to the condition of a large portion of the city of Ogdensburg which I examined last fall. Much of the filth in the privy vaults and cess-pools, and that thrown upon the ground in the yards and streets is rapidly dissolved and passes downward into the ground water. The soil of Gouverneur is, therefore, saturated with dilute sewage which is flowing into the wells and being carried into the cellars by percolation. This dilute sewage is being drunk from the wells by a large portion of the people of the village. It also percolates into the cellars, and the emanations from it are thence carried upward by the warm currents of the house to the living apartments above. These emanations of moisture and filth undermine the resisting power of the constitution, and often carry with them the fatal germs of specific disease.

The soil of a large part of Gouverneur is saturated to within two or three feet of the surface with filthy moisture, which is being drunk and breathed by the people. Specimens of this water have been examined biologically and also tested for chlorine. The water swarms with micro-organisms, and the samples tested showed a large percentage of chlorine, undoubtedly derived from sewage. The investigations of Dr. Curtis as to the prevalent diseases show how seriously the health of Gouverneur is affected by these conditions. The death-rate in this small community is already twenty per thousand. *Thirty-eight* per cent of the total deaths are from zymotic diseases. Fifty per cent of the total deaths are from zymotic diseases and consumption. The percentage of deaths from cerebro-spinal meningitis is seven times what it is in the rest of the State. This death-rate from zymotic disease is almost unparalleled in this State. Even in New York city, with its crowded tenement population, the percentage of deaths from the zymotic diseases, to the total number of deaths, is only 28.4 per cent, while in some cities the percentage of deaths from zymotic disease is from 14 to 16. It is not too much to say that during the last year and a half at least one-quarter of the deaths in Gouverneur could have been prevented by proper sanitary precautions. These needless deaths are the distinct result of the violation of absolute law.

It thus appears from Dr. Curtis' report that the mortality from preventable diseases in Gouverneur for the last year and a half has been most excessive, and the nature of the diseases, together with the conditions observed, prove that the mortality is principally due to the saturation of the soil with polluted water. In view of these facts I will briefly state the outline of the measures which will most effectually remedy the sanitary evils from which the people of Gouverneur are suffering.

It is to be noted at the outset that the topographical position of the village is such that storm water is rapidly drained from it through the several streamlets and ravines that empty into the river. Nature has provided ample means for the surface drainage of the

place. The saturation of the soil comes, as it does in Ogdensburg, from an abundant sub-soil or ground water, kept comparatively near the surface by the character of the underlying formation and doubtless flowing in general toward the Oswegatchie river, in whose valley both Gouverneur and Ogdensburg are situated. In addition to this the soil in the village is made the receptacle of all the sewage and filth of three thousand people. The sanitary difficulties of the village arise from the soil water and sewage, the sewage being the animal and vegetable waste produced in the town. To insure healthfulness the ground water must be lowered and the sewage removed from the place. There is but one method of lowering the ground water, and that is by artificial drainage of the sub-soil, and the only way to get rid of sewage is by building sewers.

The village, as I have stated, is fortunately so situated that it need make no provision for storm water in building sewers. *They should be made to carry sewage only.* A system of glazed-pipe sewers from six to eight inches in diameter will easily carry off all of the sewage of the place and deliver it at a proper outfall; but these sewers must be of the best glazed pipe, with joints as tight as can be made, and no storm water should be allowed to enter them, nor any sub-soil water; nor should they be connected in any way with the cellars. They should have automatic flush-tanks at all of the dead ends to secure a daily flushing and cleaning of the sewer pipes. In the trenches with the sewers should be laid agricultural drain tile, branches from which should be carried up to the houses and under the floors of the cellars. These drain tile, if properly laid, will reduce the level of the sub-soil water to the level of the drain. They should be laid at least six feet below the surface. The sub-soil drains should have no connection with the sewers. Their part is simply to carry off sub-soil waters and they may be given outlet into the ravines or brooklets which run through the village, or into the river. While laid in the same trenches with the sewer pipes, they need not be one continuous system, all flowing toward a common outlet, but may find outlet at any convenient point and pass off with the surface waters.

Accustomed as people are to large sewers and large pipes it is hard for those who are not familiar with the working of small-pipe sewers to realize how thoroughly they do their work and how great the sanitary advantages are of having pipes as small as possible.

Dr. Curtis called my attention to a proposed plan of arching over the brook which runs through the village and running lateral sewers into this as a main sewer. The project is to be *emphatically condemned on sanitary grounds* as well as economical. It will be a costly nuisance. Such a sewer must be built large enough to carry the flow of the brook in times of excessive flooding. It will, therefore, have to be perhaps fifty times larger than is necessary to carry the flow of the sewage alone; for usually the sewage of a population like that of Gouverneur can be discharged through an eight-inch pipe. In such a brook as that which runs through Gouverneur the

flow of water is small in summer and often insufficient to carry the solid matters that would come down from lateral sewers. Accumulations of solid matter would take place where the lateral sewers enter the brook, and these being covered from the sun and air would putrefy rapidly and sometimes cause offensive odors and always produce conditions dangerous to health and life. The sewer being built of rough stone, the cracks between the stones would become receptacles for filth when floods come and wash down the accumulations of solid sewage from the mouths of the lateral sewers. This plan of making a main sewer out of a brook has unfortunately been tried in many of our villages. I have examined a number of such structures and have always found them in an unsanitary condition. Nature has provided the brook to drain off the surface water falling upon its water-shed. So far as I can learn it is answering its purpose admirably and is clean and healthful. It is much better to leave it open to the purifying influence of the sun and air and keep the sewage out of it. Probably also the cost of the sewerage system which should include the arching over of this brook would be greater than that of a system finding its outfall through sewer pipe of the proper size. The first needs, therefore, of Gouverneur are to get rid of its sewage by a system of small-pipe sewers carrying sewage only, kept clean and wholesome by automatic flush-tanks, and to get rid of its excessive sub-soil water by bringing it to a level of at least six feet below the surface by a system of agricultural drain tile laid in the trenches with the sewers, with branches extending to the houses or under the cellars. Such a system of sewerage and drainage can now be carried out at a cost very much less than it could a few years ago. Richfield Springs and several other villages have constructed similar works during the past year, and Schenectady has laid nearly twelve miles of small-pipe sewers at a very moderate cost. The result of the carrying out of these recommendations at Gouverneur would be to free the village from accumulations of filth and dry the soil; but that would not render the well water safe to drink. Even with the best systems of sewerage and drainage where a locality becomes as thickly populated as Gouverneur it is impossible to prevent the constant contamination of the wells. A proper public water supply should, therefore, be provided for potable purposes. The present supply does not seem to have the confidence of the people, and it is not clear to me that it deserves it. The water is taken from the river about opposite the center of the village. For a quarter of a mile above the in-take the surface drainage of a populous region enters the stream, and then the principal cemetery is situated immediately upon the banks of the river. It is probable that the water supply of the village should be taken from the river at least one-half a mile further up. Whether or not the water of the Oswegatchie is a pure and wholesome water it would not be possible to determine without examination of that stream in time of low water as well as in the spring and autumn.

The brown color of the water excites a prejudice against it which

may be utterly unfounded on any sanitary grounds. The question as to the wholesomeness of the Oswegatchie as a drinking water could undoubtedly be determined by investigations carried through one season.

In view of all the conditions described, I, therefore, advise the committee to recommend to the citizens of Gouverneur the construction of a system of separate sewers and sub-soil drains for the removal of sub-soil water and sewage, the leaving open of the natural channels for the surface drainage of storm water, and the securing of a supply of potable water that shall be wholesome and command the confidence of the people. I recommend to the committee to advise the citizens that unless these measures are taken there is every probability of the continuance of an abnormally high death-rate from zymotic diseases, causing needless sacrifice of perhaps fifteen or twenty lives yearly.

Respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

In view of the statement of Dr. F. C. Curtis, sent by the State Board of Health to examine the sanitary condition of the village of Gouverneur, in the county of St. Lawrence, and the examination of its conditions, James T. Gardiner, consulting engineer of the Board, confirming the causes of the large and extraordinary mortality in the village, which causes are believed to be chiefly "soil saturation combined with filth under and around human dwellings," the use of unwholesome water, your committee recommend first of all the removal of the causes named in these reports. They ought to be and are within the present legal control of the authorities of the village. Particularized as they now are it becomes the duty of the citizens and the authorities to begin and complete the work of improvement herein specified. Proper drainage and sewerage are the first to be provided, and the health and comfort of 3,000 people depend upon providing both as speedily as possible. What ought to be done and the reasons for the kind of work recommended, and what ought not to be done and the reasons therefor, are fully set forth in the report of the consulting engineer. The death-rate it is believed may be reduced at least one-quarter by the timely and practical prevention of the diseases named which are causing so many deaths; the committee, therefore, hereby concur in the statement of Dr. Curtis as to the causes of mortality in the village of Gouverneur and in the recommendations of the consulting engineer, Mr. Gardiner, as to the needed drainage, sewerage and the supply of pure water.

ERASTUS BROOKS,
Chairman of the Committee on Drainage, Sewerage and Topography.

At a special meeting of the State Board of Health, on the 14th January, 1886, the report of the sanitary committee on Gouverneur was presented, and on motion it was received and its recommendations adopted.

ALFRED L. CARROLL, M. D.,
January 14, 1886. *Secretary.*

SEWER NUISANCE AT ALBION, N. Y.

ALBION, N. Y., *June* 9, 1885.

To Dr. E. M. MOORE, *Rochester, N. Y., President of the State Board of Health:*

We, the undersigned, respectfully wish to call your attention to the outlet of the main sewers of this village. The waters at their mouths are conveyed for quite a distance through open and clogged ditches, emptying into a race, when they could be covered and run under said race into a creek with several feet more fall. They do not now have sufficient fall to carry off the sediment which collects at every shower along the whole line of sewers. Bottom of said sewers is covered with a nasty black slime, which is very offensive when exposed to the air. A good number of citizens, residing in the vicinity of these outlets, petitioned the local board of health to abate the nuisance. The health officer of the board pronounced it a nuisance and claimed it should be abated. He also claimed that this village is in a very unhealthy condition, with many cases of malarial fever and ague as the result of the bad sewerage of the village. He labored with the other members of the board for an abatement of the nuisance regardless of cost, but they ignored him entirely on the ground of dollars and cents.

We respectfully ask an inspection by your honorable Board. Would be pleased to have a member of your Board go over the ground, in company with our health officer, and see if something cannot be done for our relief before the warm weather begins. Please find inclosed stamp for reply to G. H. Ashby, who will cheerfully reply to any questions you may see fit to ask in regard to the matter.

(Signed), G. H. ASHBY,
R. E. HOWARD,
GEORGE W. KING,
W. T. DORRANCE,
WILLIAM CAMERON,
PETER McGOWAN.

Inclosed find petition, which was handed to local board.

REPORT OF ENGINEER.

To the Chairman of the Committee on Drainage, Sewerage and Topography:

SIR — In accordance with your instructions I have recently ex-

amined the conditions at Albion that have been the cause of complaint by certain residents, and herewith submit my report.

The village of Albion lies on both sides of the Erie canal, the main portion being on the southern side, the canal running nearly east at this place. The natural drainage of the country is to the northward, the slopes being very gentle, but in most places sufficient to secure good drainage.

All the sewerage of that portion of the village lying on the south side of the canal must necessarily discharge into it or be carried under it. The State has provided ample culverts for carrying the sewage and very much of the storm water under the canal.

There is a sewer running down Main street in a northerly direction, to the canal, passing under the latter and continuing as a roughly-built sewer of stone, for a distance of about one-half a mile beyond the canal. The sewer empties into a mill-race which flows along the south side of Caroline street for about 1,800 feet.

It is stated that the stone sewer on the north side of the canal was built by the State for its entire length, and that the owner of the mill-race preferred to have it discharge into the race, instead of passing under it and discharging into a branch of Sandy creek, about 200 feet distant and six feet below the race.

The nuisance complained of does not arise, or only in small part, from filthy discharges into the mill-race, but from the setting back of the water of the race up the sewer, and the flooding of cellars and low places.

There is undoubtedly a discharge of house drainage into the Main street sewer, but as there is no public water supply the solid matters of the sewage are for the most part deposited during the long passage through the primitive sewer, and the effluent is clear, unobjectionable to the sight, and without much odor.

The mill-race spoken of is supplied largely from waste water of the canal, and in dry times the adjacent creek receives almost its entire supply from the same source. The average amount of water flowing in the mill-race is nearly as great as that in the creek.

The mill-race is subject to daily fluctuations of level of six inches or more, besides more considerable changes of level, depending upon the season of the year. These fluctuations must have the effect of changing the level of the ground water in the immediate vicinity, and they are not improbably the cause of malaria in the adjoining houses, some twelve or fifteen in number.

SUGGESTIONS AS TO REMEDIES.

The sewer mentioned as a cause of complaint could easily be led under the mill-race into the creek, and as a temporary and inexpensive means of relief this would be a desirable improvement. The additional supply of water brought into the mill-race by the sewer is too small in amount to be of any value to the mill-owner.

The purchase of the milling privilege, which is of much less value than formerly, with the entire abandonment of the race, would be

a great sanitary improvement, and would at the same time enhance the value of property on the south side of Caroline street.

The entire village of Albion is much in need of a good system of sewers, for removing house waste and excrementary matters. No system can be recommended without careful surveys, and precautions must be taken to secure a proper outlet for any system adopted. Unpurified sewage discharged into the small brooks in the vicinity would undoubtedly occasion a nuisance.

It is not apparent that the State is in any manner responsible for the conditions that are the present cause of complaint. A temporary remedy is very simple, as pointed out, and is entirely within the powers of the village.

The more serious sanitary defects are the absence of proper sewers and the existence of the mill-race.

Very respectfully yours,

HORACE ANDREWS, *C. E.*

ALBANY, N. Y., *December* 9, 1885.

In accordance with the following report from Horace Andrews, civil engineer, employed by the State Board of Health to examine the mill-race and main sewer in the village of Albion, in answer to a petition laid before the Board at their meeting held in New York city, November 16, 1885, the committee present the following conclusions as the result of a careful examination of the evil complained of by citizens of Albion. The proper method and agencies to remove the evils named rests with the local authorities. In the judgment of your committee after the examinations now made, the State Board is not authorized to advise any other mode of relief than one wholly within the power and duty of the village authorities of Albion. The State is no way responsible for the conditions complained of.

ERASTUS BROOKS,

Chairman of the Committee on Sewerage, Drainage and Topography.

STATEN ISLAND, *December* 18, 1885.

REPORT ON THE SEWERAGE AND DRAINAGE OF MIDDLETOWN.

To the Committee on Drainage, Sewerage and Topography of the State Board of Health:

GENTLEMEN —A communication having been received from Hon. E. M. Madden on behalf of the citizens of Middletown requesting the State Board of Health to send an engineer to make a sanitary examination of that village and advise as to a general course of procedure with regard to sewerage and drainage, I proceeded to Middletown on the 19th inst., in accordance with instructions from the Board, and beg to make the following report:

TOPOGRAPHY.

The village of Middletown, having a population of some ten thousand people, is situated on a high rolling country, in Orange

county, with attractive surroundings and with a climate undoubtedly healthful. The village itself is sufficiently hilly to give diversity to its streets and to afford admirable natural opportunities for drainage. The small stream which flows through the lower part has several branches which afford good natural channels for surface drainage. The sidewalks of the village are in an unusually good condition, being flagged and having well-curbed and paved gutters. The attention which has been paid to the condition of the streets has secured excellent surface drainage throughout the village. The soil of a small district is gravelly but the greater part is clay, very hard and containing many boulders. This soil is to be found both in the flatter parts of the village and on some of the steeper hillsides. As I have said, the whole village, both in its lower parts and on its steeper hillsides, is admirably adapted to a complete and thorough system of drainage and sewerage. The obstacles to be overcome are unusually small.

EXISTING SEWERS.

To overcome the difficulties which have arisen from the washing of the steeper streets in heavy rain, certain large storm-water sewers have been built and have effectually answered their purpose; but these sewers, in a small portion of the village which they cover, are also used for carrying away sewage. They, however, reach only a very few of the streets. I was unable to ascertain their total length; but they amount to a small fraction of the whole village. There appear to be some ten miles of streets in the village which either require sewers now or will at a very early day.

The present system of storm-water sewers empties into the creek which drains the surface of the village at a point below which there is a large population living close to the banks of the stream. I examined the condition of the stream and found that the bed both under the water and that part which is now dry is thickly coated with decomposing filth; it is in fact an open sewer.

NUISANCES.

The condition of the main creek is in my judgment a nuisance endangering the health of the people who reside in the neighborhood of the stream, and the same may be said of the other branches of the creek which flow through the village. House drains are everywhere running into them and carrying not only house slops but human excrement; they are already fouled to such a degree that the smell from them is at times very strong. I think the condition of all these streams is such as to make them public nuisances, dangerous to the life and health of the people who live along them. But as there are no sewers through much of the town, and as cesspools are likely to fill and overflow when made in a hard-clay soil, it is almost impossible for the people to dispose of their house wastes in a sanitary manner.

The fault is not in the habits and desires of the people, for the

condition of the premises, even throughout the suburbs of the village, shows the desire of the people to keep their surroundings in as good a condition as possible. Were the streets of the village sewered, even in the suburbs, a very large proportion of the people would at once make connection with their houses.

SEWAGE DISPOSAL.

The stream which drains the surface of Middletown and runs from there several miles down to the Wallkill is so small that it will not be possible to make of it the outfall for the sewerage of Middletown, without a partial purification of the sewage before pouring it into the stream. If crude sewage is turned into the brook a nuisance will undoubtedly be created, the results of which cannot be foreseen. It will in my judgment be perfectly practicable to purify the sewage of the village in precipitation tanks for a reasonable sum, and turn the effluent into the creek without creating a nuisance. These works can be so arranged as to purify the sewage to any extent which experience may prove to be necessary under the circumstances. For two reasons it is specially important that the filth of Middletown should not go into the soil about the dwellings: first, that a very great proportion of the people during the summer season are using water from surface wells. The level of the water in these is seldom over five or six feet below the surface of the ground. They are, therefore, peculiarly liable to pollution. The city has a public water supply, but a great number of the people prefer well water on account of its coolness in summer and on account of the supposed difference in taste between it and the public water supply. The use of surface wells is likely to speedily increase when proper sewers and drains are made through the village.

Another serious nuisance from polluting the soil is found in the fact that in the north and north-eastern part of the village the ground water rises to the floors of the cellars and very often enters them. If this ground water is seriously polluted, the air of the cellars is contaminated to a dangerous degree. Filth is bad for human health, and moisture is bad, but wet filth is one of the most dangerous conditions to which human life can be exposed.

The president of the village, Mr. J. N. Pronk, showed me through a large part of the village. We visited some premises where the ground water rises so high as to take into solution the contents of the privies. The people in this region were drinking water from surface wells, and had wet cellars. In fact, it seemed from the examination I made, and from the information I received from the president of the village, that from one-half to three-fourths of the inhabitants of the village are troubled with wet cellars.

Out of one hundred and sixty-three deaths which were reported to the State Board of Health from Middletown during the last ten months, twenty-five are from consumption. I cannot but believe that many of these deaths are due to the people living over saturated soils. Important as it is to provide for the removal of the filth of

Middletown, it is equally important to drain the sub-soil water down to a level which shall secure the dryness of all cellars; and this seems perfectly practicable. The death-rate of the village is moderate, doubtless owing to its salubrious situation; but many of the deaths which result from soil saturation or filth poisoning can doubtless be prevented, and the village made unusually healthful.

In general the wetness of the cellars, arising not from accumulations of storm water, but from a high level of the ground water and accumulations of filth in the soil, contaminating the soil water and the ground-air, and thus polluting the air of the cellars and the water of the wells, seem to be the principal insanitary conditions of the village.

In one or two places storm water is occasioning some inconvenience by washing the streets where the hillsides are unusually steep. The difficulty, however, can be remedied at a small cost. As regards the present sewers, they are not in proper sanitary condition. On opening a man-hole in the main sewer, in company with the president of the village, I found the stench from it intolerable, and he informed me that it had been cleaned out within the last six months. In a distance of perhaps a thousand feet some twenty car-loads of filth were taken out from this sewer. They were brought to the man-holes in a wheelbarrow and hoisted out. I regret to say that the man who did the work is reported to have died in consequence. I did not wonder after the examination made of this single man-hole.

It is perfectly possible to greatly improve the condition of these large sewers by devices for flushing and ventilation; and this should most certainly be done, as their present condition is dangerous to the public health.

As regards the manufacturing wastes which now, to some extent, pollute the stream, they would, of course, be easily provided for if there was any general system of sewerage through the village.

PLAN FOR SEWERAGE AND DRAINAGE.

Recognizing the fact that the sewers which are already built will with very slight additions provide for the carrying off of storm water and surface drainage so as to prevent any danger to health or inconvenience from the washing of streets, the sanitary evils which are to be remedied in Middletown are two-fold; namely, the soil saturation, and the accumulations of filth.

There are three different methods of overcoming these difficulties; first, to expand the present system of combined sewers to take in the whole village. Second, to leave the existing sewers to take storm water alone, and to carry a separate system of small pipes for sewage only through the village, accompanied with a system of sub-soil drain tile to provide for the drainage of cellars and sub-soil. Third, to carry over the unsewered part of the village the separate system, and to utilize as part of it the sewers which have already been built, taking into the separate system the low-water flow of these sewers and excluding the heavy bodies of storm water which they carry in time of rain.

These plans will differ in cost and each has its own advantages and disadvantages. It is not possible to say without a careful survey what the relative cost and advantages will be; but it would appear probable that the expansion of the combined system over the whole village would be far more expensive than the other two which have been named. The least costly would probably be the utilizing of what has already been done and the construction of the separate system through the unsewered part, making the plan, however, in such a way that if any street choose to lay down small pipe in place of the present large sewer, they could do so at their own option.

In my judgement the most satisfactory way for the citizens of Middletown would be to have surveys and estimates made for each of these plans, and a report setting forth their advantages and disadvantages. They could then determine which on the whole would be most satisfactory. As regards merely the sanitary side of the question, the investigations of the State Board of Health have shown that small sewers which can be constantly flushed by automatic means are very much easier to keep clean than large sewers, by which storm water is admitted. This is especially true in villages with unpaved streets, where the slopes are so steep that large amounts of gravel are washed into the sewers, making dams which hold back the sewage so that it putrifies and the sewers become merely prolonged cess-pools. This we find to be the condition of the large sewers in the village of Mt. Vernon, although they have a considerable slope, and it is doubtless the condition of the main sewer in Middletown, in the upper half of its course.

I do not mean to say that such a condition cannot be remedied; but that the sewers which receive the wash of the streets in unpaved villages are far more difficult to keep clean than those which receive only house sewage and are so small that they can be thoroughly flushed every day without a large expenditure of water.

CONCLUSION.

I find that the people of Middletown are practically unanimous in their desire to have the village thoroughly sewered and drained, and the only question is, how it can best be done. Their experience has taught them that it would be far more economical for the property-owners if a definite plan is laid out, so that the assessment for sewer purposes on each property-owner can be determined once for all and the same property not be made to pay several times, on the theory that it was benefited by every sewer in its neighborhood, which has sometimes been the case, not only in Middletown, but in Albany, and every other city which is without a general system of sewerage.

My opinion is that a plan for the sewerage and drainage of Middletown could be devised which could be carried out as fast as the people desired for a total cost not to exceed $1.25 a running foot, which would be equivalent to an assessment of sixty-two and one-half cents a front foot on the property benefited. No piece of property should be assessed more than once. In view of the reason-

able cost at which the sanitary evils which threaten the health of Middletown can be relieved, and in view of the condition of public sentiment, which prompts immediate action in this direction, I recommend that a topographical survey of the village should be made, including such data as are necessary to be taken into consideration for the sewerage and drainage of the place, with plans of present sewers; and that based on these surveys three preliminary plans be made, one for the extension of the combined system over the whole village; another for carrying the separate system over the whole village; and the third for carrying the separate system over the unsewered part of the village, taking into it the ordinary flow of the existing sewers; and that a report be made, setting forth the cost and the relative economical and sanitary advantages of these different plans; that these be laid before the proper authorities of Middletown, and, when they have decided which shall be adopted, that a working plan of that system be made so detailed that the work of construction can proceed at any time when the village is prepared to undertake it.

Very respectfully,
JAMES T. GARDINER,
Consulting Engineer.

To Hon. E. M. MADDEN *and other citizens of Middletown, N. Y.:*

The undersigned committee, to whom the appllication for advice regarding the sewerage of Middletown was referred with power by the State Board of Health, at its meeting on June 15th, respectfully makes the following report:

A sanitary examination was made under our direction on the 29th of June by Mr. James T. Gardiner, formerly a member of the State Board of Health, and now its consulting engineer.

The facts reported by him show that the health of Middletown is threatened over a large part of the village by saturated soil producing wet cellars and by ground water and ground air becoming polluted with filth from cess-pools and privies.

This pollution of the ground water undoubtedly affects the health of the people by contaminating the wells and the ground air about the dwellings. This ground air is sucked into the cellars by the heat of the houses, and rises through the dwellings. Especially is this true during the winter months when the surface of the ground is frozen and the cellar windows closed. The filth pollution is also carried into the cellars by percolation of the ground water.

It further appears that the brooks which take the surface drainage of the village have been converted into open sewers and that they are in a condition not only offensive but dangerous to life and health. The soil saturation appears to be due not to accumulations of storm water but to actual sub-soil water.

The topography of the village seems to admit of a thorough system of drainage and sewerage. Exactly what plan would be best to adopt is somewhat complicated by the existence of a partial system of combined sewers already constructed.

While the experience of this Board is that the separate system has, in cases like that of Middletown, very decided sanitary advantages, it will doubtless be more satisfactory to your citizens to know the relative cost and advantages and disadvantages of the various means by which your insanitary condition may be relieved.

The Board, therefore, advises you that drainage and sewerage are necessary to your village, and the construction of a proper system will doubtless improve the public health and lower the death-rate, although this is not at present high.

We approve of the recommendation of Mr. Gardiner that you should have made a survey and preliminary plans from which to determine the relative cost and advantages of the different methods of drainage and sewerage; and having chosen the general method of procedure, you should have made a careful working plan upon which all sewers could be constructed. In selecting a plan for final adoption it is to be hoped that, since the work is for a sanitary purpose, the plan will be chosen which is of the greatest sanitary advantage, irrespective of any small difference of cost. The experience of the board in the villages of this State has been that the least expensive system was generally best from a sanitary point of view.

ERASTUS BROOKS,
Chairman of the Committee on Drainage and Sewerage.

SEWERAGE OF WARSAW.

WARSAW, N. Y., *May* 22, 1885.

To the State Board of Health:

GENTLEMEN — We believe that a due regard for the health of our villages requires us to invoke the aid of the State Board of Health, to assist us in arriving at a practical solution of the perplexing question before us:

First. What are the best and most available means of correcting or modifying the deleterious influence of certain ditches that have long since partially assumed the character of sewers.

Second. What is the most feasible and best plan for establishing a proper system of sewerage for this village? The village of Warsaw contains a population of over 2,000 inhabitants and is situated in a deep valley running nearly north and south. The water-shed on either side of the valley is quite extensive, and although most of the water is carried off by brooks leading down numerous ravines, still a large amount finds its way to the level of the valley, by soaking through the soil — in many instances flooding cellars and saturating the soil with a surplus of water.

A large part of the village is situated on the comparatively level ground in the valley, and numerous cellars are subjected to inundations every spring. There are many cellars which are never dry during the year, and at the present there is no opportunity to drain them. The principal cause of perplexity, however, is an open ditch which was constructed more than thirty years ago for the purpose

of carrying off surface water. It is located in the eastern part of the village, and runs diagonally across the slope of the hill. This ditch has gradually assumed the character of a sewer —in some instances sewerage from houses many rods distant being conducted to it, or directed toward low places that are eventually washed into it by rain storms. The current of the ditch is sluggish, and in the summer months the volume of water is small, sometimes ceasing to run and standing in small pools. In many instances, wells from which water is obtained for drinking purposes, also culinary uses, are situated within a few feet of it, and are *probably* more or less contaminated by it. Last summer several cases of fever (four we believe) occurred in families living near it, and our physician did not hesitate to attribute the cause to the condition of the ditch. The question naturally arises, why do not the local board of health condemn the ditch? *First.* There is no system of sewerage in the village to take the place of it. *Second.* There is no adequate sum of money available to make even a respectable beginning of such a system, unless it can be built for much less than any estimates that we have ever had. *Third.* If the people were compelled to make cess-pools the probability is that they would soon become as great a nuisance as the ditch. Last summer a public meeting was called to consider the question of sewerage and devise plans to abate the nuisance of this ditch or sewer. A committee was appointed to obtain estimates on the cost of building a main sewer. At an adjourned meeting they reported, but the estimates were so high that it was practically impossible to build it. We feel that we have no frivolous questions for your solution, and pray that you may send us a competent person to solve the question which we feel needs more experience and ability than we can command.

Very respectfully yours,

A. B. BISHOP, *President*,
L. L. CHAFFEE,
W. J. SERVICE,
FRANK WILSON,
CHAS. J. GARDNER,
J. W. KNAPP,
Town Board of Health.
J. W. H. SHIPLER,
Town Clerk.
D. E. MATTISON, M. D.,
Health Officer.

We unite with the local board of health in praying that their request may be granted.

J. P. RANDALL, *President*,
M. D. CHACE,
Z. Y. LUSK,
A. T. GAGE,
WM. BRISTOL,
Village Trustees.

ENGINEER'S REPORT.

HON. ERASTUS BROOKS, *Chairman of the Committee on Drainage, Sewerage and Topography:*

DEAR SIR — I have examined into the conditions that prevail in the village of Warsaw, the county seat of Wyoming county, in response to a petition from the town board of health and the village trustees, made on the 22d of May last, to the State Board of Health, and which was referred to me for investigation.

I have the honor to submit the following report:

SITUATION OF WARSAW.

The village of Warsaw, containing about 2,000 inhabitants, is situated upon Oatka creek, which runs at this place in a northerly direction. The sides of the valley, through which the creek flows, rise somewhat abruptly to a height of 200 feet or more. At the place where the village is situated the valley is nearly level for a width of about one-quarter of a mile on each side of Oatka creek; a short distance north of the village the level portion of the valley increases in width.

The main street of the village runs in a direction almost exactly north and south, and is a short distance east of Oatka creek, which it crosses, however, in the southern part of the village.

The principal portion of the village lies to the east of the creek, though quite a large number of residences are on its west side.

There are six or seven streets crossing Main street at right angles and running eastward up the hillside until an abrupt slope is reached, these streets also extend to the west as far as the creek, and one of them crosses it by means of a stone bridge, and passes up the steep westerly slope of the valley to the station of the Erie railway. There are also several streets on each side of the creek, running in a direction parallel to that of Main street.

The Erie railway, running along the hillside on the west, and the Rochester and Pittsburgh railway, on the east side of the valley, are both at a considerable elevation above Oatka creek. For convenience of railway transportation the numerous salt wells, which have been sunk during the past few years, are situated high above the bottom of the valley. The wells are of great depth, as much as 1,600 feet in one instance. Some 200 feet of boring would have been saved if railroad facilities had been found near the bottom of the valley.

SURFACE DRAINAGE.

In many places the water from rains and melting snows has worn deep ravines in the hillsides. The quantity of water flowing in some of these ravines is, at times, very considerable. To prevent a similar erosion in the lateral streets running east from Main street a ditch, now known as the "Corporation ditch," was dug many years ago. This ditch, throughout a part of its course, runs parallel to Main street

and about 300 or 400 yards east of it, afterward it turns to the west, crossing Main street, and finally enters Oatka creek.

The "Corporation ditch" removes a large amount of surface water, and the ditches at the sides of the street suffice for the removal of the remainder, though they would probably perform their functions better in many places if they were kept free from grass, which grows in them to a large extent.

SUB-SOIL WATER.

On the west side of the valley there is much shale, lying in nearly horizontal strata, while lower down the hillsides there is considerable gravel. On the east side of the creek the soil is very generally of a gravelly nature, and there are indications that the bed of the creek has been at some previous time in a different position from its present one. In the more level parts of the village, water is met with at a depth of from five to twelve feet; on Main street it is generally found at a depth of eight feet. In many places the cellars are permanently wet, and are in a suitable condition to occasion sickness.

Striking proof of the great permeability of the sub-soil is met with in the western part of the village, where the waste water from one of the salt wells flows down a ravine, impregnating some of the wells in the vicinity with salt. One of the wells was examined by me and a sample of the water was obtained. This well was sixty feet from the water-course at its nearest point; but no water was flowing through the channel, which was quite dry in places for a long distance above the well. The water from the well in question seems rather more saline to the taste than ordinary sea water.

There is every reason to believe that the soil in the eastern part of the village is quite as porous as in the western portion, though there are no salt wells directly east of the village whose waste waters can permeate the sub-soil.

HOUSE DRAINAGE AND FILTH DISPOSAL.

Most of the houses are provided with privies of the ordinary and faulty construction. No effort is made to secure water-tight vaults or receptacles for excrementary matters. Along the course of the "Corporation ditch" many privies are built within a few feet of its banks; the ditch is said to be in general use for the drainage of sinks, etc.

There are in many places deposits of filth along the bed of the ditch; at some points the ditch is nearly dry from soakage and evaporation, while at others the flow from springs is received and the water becomes clearer. A sample of water obtained near the mouth of the ditch does not appear much more objectionable, as far as clearness is concerned, than that taken from a well which was shown me by the health officer.

A good water supply, taken from springs at a considerable eleva-

tion above the village, has been distributed throughout the thickly-settled portion of the village for several years.

The larger number of families are said to use well water in preference to that furnished by the water company, either because it is cooler and may be considered pleasanter to the taste, with carelessness, as regards danger of filth contamination, or because the well water can be more cheaply obtained than that furnished by the company.

UNSANITARY CONDITIONS.

There can be no question but that much of the liquid matter from house drainage finds its way into the wells. Water-closets are not in very general use at present, though they are constantly being introduced, and the water carriage of excrementary matters may in time increase the pollution of the wells.

The inhabitants of Warsaw have a practical illustration of the dangers of filth contamination in the salt impregnated wells in the western part of the village. Most of the wells in the village are more favorably situated for receiving sewage pollution than those wells whose taste betrays the presence of salt are for receiving the waste waters of the salt works.

It should be remembered that clearness of color and pleasantness of taste are no proofs that water is not receiving the drainage from privies and filthy ditches.

Since it is improbable that the use of well water for drinking purposes will be entirely abandoned for many years, the vaults of all privies should be made small and perfectly water-tight, or, if these are still to be in general use, enlightened public opinion should compel the use of water-tight tubs or pails, to be removed under village authority every few days.

VILLAGE SEWERS.

At various times the advisability of constructing a system of sewers has been discussed, and surveys have been made to ascertain the grades that would be required. It has been found that a sewer could be laid in Main street, running to the north, and finally turning to the west and discharging into Oatka creek, while laterals can easily be laid in the streets running east from Main street. The estimated cost of this system of sewers was so large that no action has been taken regarding their construction. The plan suggested was only adapted to the needs of a portion of the village, and the removal of all waste waters, including surface water, sub-soil water and house drainage, was contemplated.

Very recently a number of citizens have, by the consent of the village authorities, constructed a private sewer, of large sized vitrified pipe, running through private property and discharging into the tail-race of a mill near the creek. About twenty-five water-closets are now said to be connected with this small sewer.

The construction of private sewers, forming no part of a well-de-

vised plan, is certainly a very objectionable proceeding, and the needless encroachment upon private property is to be deplored.

As a means of disposal of house drainage, a system of sewers of moderate cost would appear to meet the necessities of the case much better than the use of tubs or water-tight privy vaults. If the sub-soil water could, at the same time, be lowered sufficiently to dry the cellars, the sewers would undoubtedly give a great deal of satisfaction to all who would share in their benefits.

SUGGESTIONS REGARDING SEWERAGE.

It is earnestly to be hoped that no more sewers will be constructed until a carefully considered plan of sewerage for the whole village has been adopted.

For economical reasons and on sanitary grounds it is to be recommended that the system adopted shall be the "separate system," for house drainage, only the sub-soil water to be removed by tile drains laid in the sewer trenches and up to the cellars of adjoining houses.

It is exceedingly desirable that the sewers should be confined to the streets, and be laid through private land only where it is absolutely necessary to do so.

The contemplated outlet for the village sewage is Oatka creek, which already receives a quantity of it.

This creek flows northerly and empties into the Genesee river, about ten miles south of Rochester, after a course of thirty-three miles from Warsaw. The nearest village below Warsaw is Wyoming, about six and a half miles distant. Le Roy, the most important village below Warsaw, is nineteen miles distant, as the creek flows. The creek is said not to be used for drinking purposes at any point of its course; notwithstanding this fact, it is not an outlet for raw sewage that can be recommended. The creek has a small flow in dry seasons, and its waters would then be badly polluted if the sewers were discharged into it. In devising a system of sewers the gradients should be so chosen, if possible, that the sewage may, whenever desirable, be purified by some approved method, without the necessity of pumping. After purification, the sewage could enter the creek without occasioning a nuisance and with much less danger to those below Warsaw who might drink the water. The advisability of some treatment of the sewage, before it can be discharged into potable water, is an additional and very strong argument for excluding surface and sub-soil water from the sewers.

Two main sewers would appear to be needed, one on each side of the creek. One of these sewers could extend along Main street and would suffice for the drainage of all buildings on that street and those east of it. The details of such a plan of sewerage can only be ascertained by careful instrumental surveys. A rough estimate of the cost of the Main street system would be as follows:

3,200 feet of fifteen-inch vitrified pipe, laid.........	$4,000 00
8,000 feet of six-inch vitrified pipe, laid............	2,400 00
6 flushing tanks..................................	380 00
12 man-holes......................................	360 00
19,600 rods of three-inch drain-tiles................	4,000 00
Engineering and contingencies.....................	1,200 00
Total	$12,340 00

The necessary four-inch pipes for house drains, with lateral drain-tiles and Y connections at the sewers, will probably cost $25 for each house connection. The entire plan should be devised by a competent engineer, and carried out with the greatest precautions to insure faithful work.

Leaving out of account the expense of purifying the sewage, it does not appear that the cost of the Main street system, which would benefit the greater part of the village, should exceed $12,500.

NECESSITY OF CONSTANT SUPERVISION.

Unless well constructed, any system of sewers is sure to prove a nuisance, and without constant care and supervision, after completion the sewers will very imperfectly fulfill their purpose.

An inspector of sewers should be appointed to examine into the working condition of the flushing tanks, the preservation of the pipes, man-holes and outlets, and to grant permits for house connections. It should also be his duty to see that such house connections are properly made and that no surface or sub-soil water is admitted to the sewers.

The Corporation ditch should be kept clean and so improved as to remove storm water in an effective manner. Even with the largest sewers, surface water occasionally accumulates in objectionable quantities. It does not appear that any thing more than temporary inconvenience is ever occasioned at Warsaw from accumulations of surface water. It is, therefore, in the true interest of economy, as well as in that of health, that a liberal expenditure should be made for securing a system of sewers for house drainage only, and for always maintaining it in perfect order, rather than to attempt the construction of large sewers, which are apt to prove a serious nuisance on many accounts, in a village of moderate size.

The powers of the local board of health should certainly be exercised to prevent the contamination of the sub-soil water by refuse and excrementary matters. Rigorous ordinances must be adopted and strictly enforced without delay, before the sanitary condition of the village can be considered above reproach.

Very respectfully yours,

HORACE ANDREWS, JR.

ALBANY, *June* 8, 1885.

ALBANY, *June* 25, 1885.

To the Board of Health and Board of Trustees of Warsaw, N. Y.:

GENTLEMEN — From your statement to this Board on the 22d of May last, it appears that the citizens of your village have been alive to the dangers which arise from accumulations of filth in a thickly inhabited district, and have undertaken to secure plans for a system of sewerage for the village. The plans made hitherto, and presented for the approval of the citizens, however, have been so costly that they could not be carried out. It seems that your citizens are not willing to abandon the hope of properly draining the village, and your appeal to the State Board of Health for aid and advice is based upon the expectation that it may be able to suggest some practicable scheme for securing the necessary relief.

In view of these facts, Mr. Horace Andrews, Jr., an engineer of the Board, was sent to make an inspection and report as to the necessity for the sewers and the practicability of their construction at a moderate cost. A copy of his report is herewith transmitted, from which it appears that there is urgent necessity for the sewerage of the village of Warsaw. The conditions which he describes are sufficient to prove that fact.

It further appears that a system of separate sewers, large enough to carry sewage only, could probably be built for a cost not to exceed $12,500. Such a system of sewers would probably relieve the village of the principal sanitary evils which now threaten it. That small sewers, such as he describes, and properly arranged with flush-tanks are thoroughly efficient in removing sewage, has been amply demonstrated by the experience of other places. If the system is properly planned by an engineer, and thoroughly understood, it will undoubtedly be successful.

As regards the question of outfall it would appear that the sewage should be more or less purified before being allowed to flow into Oatka creek. Plans for precipitation tanks should be made at the same time as the plans for the sewerage system.

On behalf of the Board,

ERASTUS BROOKS,

Chairman of Committee on Drainage, Sewerage and Topography.

REPORT ON THE DISPOSAL OF THE SEWAGE OF WARSAW.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with your instructions I visited Warsaw and Wyoming on the 16th and 17th of September, to see whether it would be desirable for the people of the village of Warsaw to construct a system of sewers emptying into Oatka creek, and whether such disposal of the sewage would create a nuisance endangering the health of the people living on the stream below Warsaw, or in any way injure the water for the uses to which it is now put.

From the paper submitted to me by the committee I learned that

the town board of health of the town of Wyoming had protested against the action of the State Board of Health, in recommending that the village of Warsaw construct a system of sewers which should enter into Oatka creek after a proper purification of the sewage.

It appears that they fear that if the sewage of Warsaw should enter Oatka creek, the contaminated water of the stream might by percolation reach the water of the wells in Wyoming, and that the water of the stream would be unwholesome for cattle to drink; also that it would be so contaminated as not to be available for use in the salt wells. They further fear that owing to the sluggish character of the stream there would in places be deposited organic matter, the decay of which would pollute both the air and the water. In company with the president of the village, I first examined Warsaw to acquaint myself with the necessity of sewerage in that place. The conditions have been already described in the report to the Board by Mr. Horace Andrews. He in nowise exaggerates the necessity for relief from the evils which arise from the present methods of filth disposal. Much of the soil of the village is clayey, in which the ground water stands so high as to readily take in solution the filth from privies and cess-pools, and much of that which is thrown upon the surface. Damp and even wet cellars are common through many streets.

Pollution of the ground water of the village and the entrance of this contaminated water into the cellars is doubtless an insanitary condition. The open ditches which are described by Mr. Andrews are polluted and at times offensive; but I think the prevalence of wet cellars, wet with polluted ground water, is even a more serious and widespread evil than these open ditches, although the latter appeal more directly to the senses of the people.

The introduction of a water supply to the village is steadily increasing the difficulties of disposing of polluted waters. There is no remedy for these insanitary conditions excepting a system of sewers and sub-soil drainage. The difficulties that arise from storm water are few and can easily be obviated by surface ditches and gutters. Sewage and sub-soil water are the causes of the existing evils. They can only be disposed of properly by sewers and drains.

There is but one possible outfall for the sewage of the village, and that is Oatka creek, which runs through the center of the place. Several sewers and polluted ditches now empty into this stream. Although the stream is evidently a small one, in times of drought it is still large enough to carry off the fluid part of the sewage of Warsaw, provided the fluid and solid constituents of the sewage are properly separated. The fluid part might contain sufficient putrescible matter to pollute the creek in times of low water, provided it was not properly purified before admission into the stream. It seems to me evident that sewerage is necessary to protect the lives and health of the two to three thousand people living in Warsaw and that Oatka creek is the only outfall for the sewage. I, therefore, examined the creek between Warsaw and the village of

Wyoming, six miles below, to see whether the use of the creek as an outfall for the sewage of Warsaw was likely to create a nuisance along the stream. The distance by the road between Warsaw and Wyoming is six miles, while by the windings of the creek it is probably at least twelve. The central part of the valley in which the stream flows is so low and flat, and the soil so moist, that it is almost entirely used as pasture. The farm-houses stand back from one-third to one-half a mile from the center of the valley on the slopes at the foot of the hills which rise several hundred feet above the valley. The wells from which drinking water is taken are of course near the houses.

The village of Wyoming, which is situated at the foot of the hills, is some distance from the stream. One mill and two or three houses are, however, in the center of the valley, opposite the village of Wyoming. From the topographical structure of this locality; from my observation of similar valleys in western New York; and from facts which I learned regarding the flow of the sub-soil waters in the neighborhood of Warsaw, I feel sure that the flow of the ground water which supplies the wells is from the hills toward the center of the valley; and that, perhaps with the exception of one or two houses in the neighborhood of the village of Wyoming, there can be no possibility of the water of the stream percolating into the wells. The only wells which might be in any way affected are some twelve miles below Warsaw as the stream runs. Whether or not these wells would receive by percolation any water from the stream is very doubtful.

In continuing my journey down the valley I saw no places on the stream below Warsaw where the drinking water of the people would be injured by the use of Oatka creek for the sewage disposal of Warsaw.

As regards the use of the water of this creek in salt wells I found that several wells were pumping water from the creek, from which wells it was again discharged as saturated brine. The evaporation of this brine produces salt. Should any of the morbific germs be contained in the water that is used they would undoubtedly be destroyed by the heat at which the brine is kept during the process of evaporation. There is, therefore, no probability that the water of Oatka creek would be injured for use in the salt wells by the admission of the purified sewage of Warsaw into the stream.

As regards the effect on the health of cattle drinking the water of this stream, I can find no case reported either in Europe or in this country where the drinking water very slightly contaminated has proved injurious to the health of cattle.

Should the water of a creek be grossly polluted with crude sewage and its banks defiled with deposits from such sewage, it seems not improbable that the health of cattle might be injured by drinking it. Purified sewage is turned into many of the small streams of England from which cows are allowed to drink, and I can find no case of harm resulting. The danger to cattle, therefore, seems re-

mote and improbable provided that the contamination of the water is very slight. In this case the matter seems to depend upon the *amount* of the contamination, which will be very small if the sewage is properly purified, but which might be a serious matter to property owners of Wyoming, if Warsaw should neglect to properly purify the sewage. Assuming then that the sewage of Warsaw be properly purified before being turned into Oatka creek I am of the opinion that it should be allowed on the ground that it is required to protect and preserve the health of several thousand people, while against such method of sewage disposal it can only be said that there are remote possibilities of injury to cattle. Undoubtedly the laws should protect the health of the people of Wyoming by enabling them to insure the proper planning and maintenance of sewage purification works at Warsaw. If these works are properly planned and maintained there will in my judgment be no injury to the public health in the town of Wyoming. I visited the village of Wyoming, and in an interview with the health officer and one of the most active members of the board of health I explained my views in regard to this matter and the desire of the State Board of Health to protect the health of the people of Wyoming, while at the same time recommending what appears to be a necessary measure for insuring the health of Warsaw. These gentlemen seemed to accept the conclusion that harm to the health of Wyoming was improbable, provided thorough sewage purification was maintained at Warsaw. Their fear is that, however well planned the purification works may be, they will eventually be improperly maintained and the creek thereby become foul.

Should Warsaw desire to construct a system of sewerage an act for that purpose would have to pass the Legislature; provided that the present laws would not secure to the people of Wyoming the efficient maintenance by Warsaw of their purification works, a law should be passed affording the necessary redress to the people injured by any such neglect.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

REPORT OF THE COMMITTEE ON DRAINAGE, SEWERAGE AND TOPOGRAPHY ON THE DISPOSAL OF THE SEWAGE OF WARSAW.

The State Board of Health, having heretofore examined the village of Warsaw, with reference to the necessity of a system of sewerage for that village, and having recommended the construction of a system of sewers and sub-soil drains, having outfall into Oatka creek, after proper purification of the sewage, and that report having been published in the papers of Warsaw, a remonstrance was received from the town board of health of Middlebury, which lies below Warsaw in the valley of Oatka creek. The local board requested a

further examination of Oatka creek below Warsaw, and set forth certain dangers which they feared threatened the public health of Wyoming should the recommendations of the State Board of Health to Warsaw be carried out.

In response to this appeal Consulting Engineer James T. Gardiner was sent to examine the whole question and make such recommendations as the facts of the case might warrant. His report, herewith appended, is approved by the committee. It appears that the rapidly growing village of Warsaw, containing a population of between two and three thousand people, is suffering for want of a proper system of sewerage and sub-soil drainage, and that there is no other outfall for the drainage of Warsaw than Oatka creek. This creek is not used for a potable water supply below Warsaw, nor is there any house in the immediate neighborhood of the stream until it has flowed some twelve miles. The stream is used only for watering cattle and for supplying water to the salt wells. It appears that in the process of evaporating the brine from salt wells, the temperature is raised so high as to kill all morbific germs. As regards the effect of very slight pollution of water on the health of the cattle drinking it, the committee is not aware of any facts to prove that injurious effects have been suffered, although purified sewage in England is discharged into many streams which flow through pastures.

While there are remote possibilities of such injury, they should not, in our judgment, weigh against the positive and known evils which threaten the health of several thousand people in Warsaw. It is, however, important that the pollution of the water should be slight, and this can only be by a careful maintenance of properly-planned works for the purification of the sewage.

Proper legal provision should undoubtedly be made for protecting the rights of the people below Warsaw by insuring the thorough purification of the sewage of Warsaw at all times. We, therefore, recommend that the Board declare that, in their judgment, a system of sewerage and sub-soil drainage is necessary for the village of Warsaw, the sewage to be discharged into Oatka creek so purified as to cause no injury to the health or property of the people on the creek below.

ERASTUS BROOKS,
GEORGE W. COOK, M. D.,
EDWARD M. MOORE, M. D., *President*,
ALFRED L. CARROLL, M. D., *Secretary*,
Committee.

At a meeting of the State Board of Health on the 24th of September, at Albany, the above report was presented, and on motion was adopted by the Board, its recommendations approved and a copy ordered transmitted to the authorities of Warsaw and Wyoming.

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT ON THE DRAINAGE OF THE NEW COURT-HOUSE AT LOCKPORT.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with your instructions I visited Lockport on the 20th of July last, to examine into the question of the best method of disposing of the drainage of the new court-house. I found that the greater part of the city of Lockport is without any proper system of sewerage. Short sewers have been built on certain streets generally by private parties, which find outlet into the canal. They often end above water line, as the canal is in a cut where it passes through the western part of the city. The mouths of some of these sewers open close to the bridge on the main business streets and so near to blocks of stores that the offensive odors from the sewers or from some of them are said to be very noticeable. This is not at all unlikely, for the sewers themselves are generally so constructed that much of the fluid matter leaches out of them, leaving the solids deposited in the sewers there to putrefy and grossly contaminate the air.

The parties who live near the open sewer mouths are justly alarmed at this state of things, and the local board of health has forbidden any more sewage from being drained into some of these sewers. The only practicable outlet that I could find for the sewage of the court-house was into one of the existing sewer outlets and thence into the canal, but the city authorities have forbidden the county from using the only available sewer outlet and require them to build one of their own which shall enter the canal below water line.

On the other hand the Superintendent of Public Works has given notice that no sewer or foul-water drain of any kind shall be permitted to discharge into the canal, and that those already existing will be cut off. The county appears, therefore, unable to drain the new court-house. The Superintendent of Public Works will not allow them to build a new outlet into the canal, and the city will not allow them to use the only old one which appears to be available. The discharge of the sewage of the city of Lockport into the canal is certainly very objectionable. Not only is the air polluted by the emanations from the mouths of these sewers, but the water of the canal itself is made so foul as to be objectionable on sanitary grounds both to Lockport and to the towns below. The people of Lockport have felt greatly aggrieved that the city of Buffalo was allowed to pollute the water of the canal and in public meetings strong resolutions have been passed regarding this matter. Buffalo has now gone to great expense to build an intercepting sewer and thus prevent the contamination of the Erie canal water. The city of Lockport should remember that the people who live along the canal below them have the same right to object to their fouling the waters with the sewage of Lockport.

The pollution of the canal water by foul emanations not only endangers people living along its banks and on the canal boats, but

after careful inquiry I find that it is not at all uncommon for the boatmen to drink the canal water, and it is of course used by them for ordinary domestic purposes.

A very large number of people are, therefore, exposed to any insanitary influence arising from the waters of the Erie canal. Thousands live along its banks or on its surface during the active season and hundreds use the water for domestic purposes, while many doubtless drink of it. For these reasons it is clear that the use of the canal as an outlet for sewage should not be allowed.

The city of Lockport should construct a carefully-planned system of sewers discharging not into the canal but into Eighteen-mile creek. I examined the ground and found such a system entirely practicable, at least so far as a large part of the city is concerned. The present sewers might be used simply for carrying off storm water from the streets, and the new system be confined to sewage and sub-soil water, unless it be also necessary to provide for their carrying the overflow of cisterns.

It appears that Lockport is largely supplied with drinking water from cisterns situated in the cellars of houses for which proper overflow must be provided. As I have not made a detailed examination it would be impossible to advise at present as to the best method of providing for the overflow of these cisterns; but in general it can be said that a system of small pipe sewers provided with flush-tanks would answer all the requirements of the case.

Objection has been made to giving outfall to the sewage of the city into Eighteen-mile creek. I examined the ground and can see no other practicable outlet for the fluids of the sewage. It appears clear that a nuisance would be created if the crude sewage should be turned into this stream. It will, therefore, be necessary in my judgment to purify the sewage before it is allowed to flow into the creek. As it will undoubtedly be some time before public opinion will be so instructed and aroused regarding the necessity of a sewerage system in Lockport, some temporary means must be provided for the drainage of the court-house. The sewer through which the sewage of the old court-house is at present discharged is not only improperly built but it is not at a proper level to drain the new county buildings. A new sewer must, therefore, be laid, whatever may be the point at which it finds outlet. It would be a measure of proper economy if this sewer should be of such dimensions and grade as to form a part of a general city sewerage system when such a system should be constructed. In consideration of the county building a sewer which would in every way be adapted to city use along the streets in which it was laid, the city might consent to the county sewer finding temporary outlet through one of the existing city sewer mouths, since no new sewer mouth can be constructed.

I, therefore, recommend that merely as a temporary expedient the county be allowed to use the most available outlet through one of the city sewers; but with a distinct understanding on the part of the city that it is a merely temporary arrangement. I informed the city

authorities and the city surveyor of my views in this matter. I do not consider this disposal of the court-house sewage a good one on sanitary grounds; but only recommend it as the best available one until proper sewers are built by the city.

Very respectfully,

JAMES T. GARDINER,

Consulting Engineer.

REPORT OF THE COMMITTEE.

The board of health of the city of Lockport having appealed to the State Board in the matter of the sewerage of the new county building situated in the city of Lockport, Consulting Engineer James T. Gardiner was instructed to examine the premises and report such recommendations as seemed best under the circumstances.

His report, hereto appended, is approved by this committee; and in accordance with his suggestions we recommend: That as a temporary expedient the new county building be allowed to find outlet for its sewage into the most available of the existing sewers.

We do not consider this a desirable permanent arrangement, but simply the best possible under the circumstances, and until a proper system of sewerage is provided for this part of the city of Lockport.

We condemn the pollution of the Erie canal with the sewage of Lockport as liable to injure the health of the people living along its banks, both in Lockport and below, as well as the health of the boatmen and their families who live on the canal.

We earnestly recommend the city of Lockport to construct a proper system of sewerage as soon as possible, so arranged with regard to outfall as to create no nuisance to the people living on the stream, which seems to be the natural outlet for the drainage of the city.

ERASTUS BROOKS,

Chairman.

At a meeting of the State Board of Health on September 24th, at Albany the above report was presented, and on motion was adopted by the Board, its recommendations approved, and a copy ordered transmitted to the county and city authorities of Lockport.

REPORT UPON NUISANCE CAUSED BY AN OPEN SEWER AT COHOES.

To the Committee on Drainage, Sewerage and Topography, of the State Board of Health:

GENTLEMEN — There exists in the central part of the city of Cohoes a sewer that is said to have been formerly a natural water-course; in more recent times this has been owned by the Cohoes Water Power Co., who used it for removing a large volume of surplus and waste water.

The Water Power Co. has at various times deeded away most

of the property along the water-course, reserving the right to discharge their waste water into the stream. At many places large arches have been built over the water-course, buildings have also been erected close to its banks, and directly over it also, for a distance of about 1,200 feet. At places, however, the stream is uncovered, and also where it empties at the tail-race of the Anchor hosiery mill on Mohawk street.

Gradually the various residents along the course of the stream have turned their house drainage into it and have built privies immediately over it in many places. The city also has a sewer, receiving the surface drainage from several streets and the sewage from a number of houses, which empties into the water-course.

Owing to the great volume of waste water constantly allowed to flow in the stream by the Cohoes Water Power Co., the sewage was entirely unnoticeable until within a year or two, when the company by constructing new flumes has abandoned the stream in question as an overflow, still permitting a small but rapid stream to flow in the wide bed of the former torrent. Now the sewage has become a decided nuisance, causing powerful and disgusting odors; moreover all kinds of refuse and garbage are thrown on the bank of the stream, where it is uncovered. The condition of the stream is such that it is an evident nuisance, especially to those whose occupations cause them to spend much of their time near the mouth of the stream and along its uncovered parts.

SUGGESTIONS FOR RELIEF.

The portion of the city traversed by the stream in question is very imperfectly sewered, the difficulties being that solid rock is everywhere met with and that whole streets are taken up by the flumes of the Water Power Co., which are arched over and themselves become the receptacles of sewage from the city sewers. At some future time proper sewers may be constructed in all the streets and a suitable outfall may be secured by means of a tunnel, as has been proposed. For the present, however, it is hardly possible that relief can be secured from the particular nuisance that is the subject of this report, by any expensive system of sewers. The most practicable plan would appear to be the construction of a sewer of moderate size along the entire length of the wide bed of the water-course. This sewer can have an invert of solid rock for nearly its whole length, about 1,200 feet, and would need to be large enough to receive the storm water and sewage.

The Cohoes Water Power Co. should also withdraw their restrictions as far as may be necessary, to allow of this small sewer being built, and should pledge themselves to continue, as at present, the discharge of a small but constant volume of water into the sewer.

The wide bed of the creek should then be filled with clean and suitable material.

No privies should be allowed on the arch of the sewer, and all

connections of every description, including the street catch-basins, should be trapped.

It is believed that the plan here proposed would be a great sanitary improvement upon the existing conditions, and that it can be carried out at small expense; while possessing features, not altogether desirable, on sanitary grounds, it will nevertheless give much needed relief from a nuisance of considerable magnitude. Whenever a definite plan for tho sewerage of that part of the city shall have been carried out and a proper outfall secured, all sewers, including the one mentioned, that pass under buildings and through private property should be abandoned and filled up.

Very respectfully yours,

HORACE ANDREWS, Jr.,
Civil Engineer.

ALBANY, *August* 6, 1885.

REPORT

OF THE

SEWERAGE OF MT. VERNON.

To the State Board of Health:

On the 21st day of April the State Board of Health was directed by the Governor to examine and report as to the existence of a nuisance in the town of East Chester, alleged to be caused by the discharge of the sewage of the village of Mt. Vernon into a small brook. The matter was referred to the committee on drainage, sewerage and topography, who took immediate action.

Although this committee had previously investigated and reported on this nuisance, it was considered best to make a second inspection through another engineer, the first examination and report having been made by Horace Andrews, Jr., C. E. In accordance with instructions, O. S. Wilson, C. E., proceeded, on the 23d of April, to Mt. Vernon and made an examination. His report is herewith given in Appendix marked B; Mr. Andrews' previous report, together with the first report of the committee, is given as Appendix marked A.

REPORT.

For a description of the conditions, we would refer to appendices A and B. Mr. Andrews' observations as to the existence of a nuisance are fully sustained by Mr. Wilson. There can be no doubt that the discharge of the sewers of the village of Mt. Vernon into the small brook, therein described, is a nuisance which is likely at times to be of serious magnitude.

By direction of the chairman of the committee, Mr. Wilson took samples of the water from the head of the brook where it enters the sewer, above the village of Mt. Vernon, and, also, samples of the outflow of the sewer. Although these were taken at three o'clock in

the afternoon, when the water would be least contaminated, and : though there had been no rain for a number of days, so that litt street drainage was emptying into the sewers, the effluent w found to be so grossly polluted as to be clearly within the term "se age." This is proved by the chemical analysis of Prof. Willis (Tucker, and the chemical and microscopical examination of Pr William H. Hailes, made at the request of the committee. T samples examined by Prof. Hailes and Prof. Tucker were not ide tical. No analysis was made of the water at the head of the sew as it was evidently very pure compared with the effluent.

It will be seen from Mr. Wilson's report that the village h strict ordinances concerning the admission of sewage into the sewe the theory being that they are intended for the drainage of stre and subsoil water alone. Whatever may be the theory, the fact that sewage is flowing from this sewer into the brook, creating dangerous nuisance. Mr. Wilson's observations, as to the conditi of Mt. Vernon, show that a complete sewerage system is ve much needed for the village itself.

Mr. Wilson fully approves of the remedy of a small interceptin sewer, suggested by Mr. Andrews in his report and previously a proved by this committee and by the Board. The work of layin this sewer, if undertaken at once, could be finished in time to gi the village the benefit of it before the hot weather. The buildin of this intercepting sewer would relieve the creek from the nuisan complained of. It would not only do this, but would also great benefit the village of Mt. Vernon, by giving it a permanent outl for a complete system of sewers, a thing very much needed.

Recommendations. In view of these facts, this committee aga recommends the Board to declare the condition of the brook, in which the sewers of the village of Mt. Vernon flow, to be a nu sance, dangerous to life and detrimental to health; and that t Board advise it to be abated, as speedily as possible, substantia as set forth in the report of Mr. Andrews, given in Appendix A.

Committee on Drainage, Sewerage and Topography.

JAMES T. GARDINER, *Chairman.*
ERASTUS BROOKS,
GEORGE W. COOKE, M. D.,
EDWARD M. MOORE, M. D., *President.*
ALFRED L. CARROLL, M. D., *Secretary.*

The above report of the committee on drainage, sewerage and topography in reference to Mt. Vernon, together with its recommendations, are hereby approved by the Board and ordered to be transmitted to the Governor, as the conclusions and recommendations of the State Board of Health.

ALFRED L. CARROLL,
Secretary.

A
REPORT
ON THE
SEWERAGE OF MT. VERNON.

To the State Board of Health:

Early in December a petition was received from a large number of the principal citizens of the Village of Mt. Vernon, Westchester county, stating that a small but living stream, running through a part of the village, is made to receive a filthy discharge from sewers which extend through some of the principal streets, and that the stream is thus rendered a foul smelling and unwholesome open sewer, the stench of which is said to be, under some conditions, perceptible at a distance of two or three thousand feet from the stream. The petitioners state that this state of things has existed for several years, and that repeated appeals to the village trustees and the local board of health have been ignored. Last year, it is said, the conditions were made worse by extending the sewers within the village, thus increasing the volume of filth with which the water-course is polluted. The petitioners add, that failing to find relief from the local authorities, they are compelled to ask that the State Board of Health intervene in their behalf.

This petition and the names of the citizens signing it are herewith appended.

As soon as possible after the receipt of this petition, about the middle of December, Mr. Horace Andrews, civil engineer, in the employ of the Board, was sent to examine into the existence of the alleged nuisance, and also into its causes and the best remedy

therefor. The sewer complained of is the outlet of a small system of sewers built ostensibly for carrying storm water and spring water only, and there are severe village ordinances against the draining into these sewers of any excremental matter. In spite of these facts, the water made foul in human dwellings, and the foul street washings come through these sewers in such quantities as to be readily observed at the outfall, although it was not demonstrated to Mr. Andrews' satisfaction that human excrement was passing through the sewer. The amount of filth however which is collected by these sewers from other sources is so great as to dangerously pollute the water of the creek, and to cause deposits of organic matter in its channel which in a state of decomposition undoubtedly endangers the health of the people.

This opinion of Mr. Andrews is corroborated by the statements of two succeeding health officers of the village, and by the testimony of a large number of influential citizens. The fact that a large amount of foul organic matter is deposited by this sewer in and along the channel of the stream is beyond question, and that this material is so great in quantity that its decay causes a serious nuisance. This committee therefore recommends that the State Board of Health declare the conditions herein described a nuisance dangerous to life and detrimental to health.

The committee have considered the recommendations of Mr. Andrews respecting the best remedy for the evil. It appears that the village of Mt. Vernon is just introducing a system of public water supply, and that there are no sewers in the village intended to carry off sewage, but that cess-pools and privies are used throughout the town. The dangers from cess-pools and privies have been so clearly set forth to the people of the State, that they need not here be dwelt upon; but whatever danger there may be in the use of cess-pools before a public water supply is available, the introduction of water, leading, as it does, to the use of three or four times as much per capita, as is consumed when wells and cisterns are the only sources of supply, introduces a new element of danger. There being no sewers, all the water fouled by use in water-closets, baths, and sinks, must find outlet into the soil, which thus becomes saturated with polluted water. Most serious epidemics often follow the introduction of an ample water supply into towns where cess-pools have been for many years in use, and which have provided no sewers to carry off the waste water. It is therefore most important for the public health of Mt. Vernon, that a system of sewerage should be at

once constructed to carry off the sewage of the village. The present sewers are available and useful only for storm water and no sewage should be admitted to them. We therefore advise that the separate system of sewers, consisting of small glazed pipe flushed with automatic flush tanks should be adopted and built at the earliest possible moment by the village of Mt. Vernon. As the construction of the sewers may take some time, we recommend that the out-fall sewer of this system be constructed first in accordance with the plan proposed by Mr. Andrews, and that this out-fall sewer, which would be made of twelve-inch glazed pipe, be used as an intercepting sewer for taking the low-water flow from the system of rain water sewers in accordance with the plans.

By an ingenious device, which is described by Mr. Andrews, the twelve-inch pipe of the separate system can be made to carry not only the low-water flow from the storm-water sewers, but also the first part of the flow in times of storm, which is often very foul on account of the street washings which come down into these sewers.

This admirable plan, suggested by Mr. Andrews, will in the opinion of the committee completely relieve the Mt. Vernon brook from pollution, either by sewage from dwellings or by foul matter washed in from the streets in times of rain.

The out-fall sewer recommended is to extend from Mt. Vernon to Hutchinson's creek, a distance of from eight to ten thousand feet. The sewage passing along this pipe will empty into Hutchinson's creek, just above the point reached by salt water. The absence of dwellings from the neighborhood of this creek, and the amount of water flowing in it, render it improbable that any nuisance will be created by the sewage emptied into it. Still it is possible that at some future time the region between Hutchinson's creek and the Sound might become inhabited, and the condition of the channel of Hutchinson's creek become a nuisance. In this case it would be necessary for the village of Mt. Vernon to purify or partially purify its sewage before allowing it to pass into the creek.

It is therefore desirable to make provision for this in the beginning by selecting a place in the line of the out-fall sewer, where small precipitation tanks can be easily constructed. Small tanks for the precipitation of sewage by means of chemicals need cause no nuisance to the neighborhood in which they are situated; and yet it would be better to have them at some distance from the localities that are to be thickly settled.

Wherever these tanks are erected, an abrupt drop of a few feet will be required in the line of the sewer, and it is desirable in selecting the grades for a sewer, that this should be taken into account in the beginning, and the grade so arranged that precipitation tanks can be erected whenever required.

The out-fall sewer extending from the mouth of the present sewer to Hutchinson's creek should be built as early in the spring as possible, and the channel of the village brook cleared out before the hot weather.

As regards the cost of this out-fall sewer, which in the beginning will act as an intercepting sewer for the sewers now built, I may say that a twelve-inch pipe is now being laid in Schenectady, six feet under ground, for forty-five cents a lineal foot, including all costs for excavation, pipe, material and labor.

The man-holes on the sewers are costing $30 each. There would need to be perhaps ten man-holes between Mt. Vernon and Hutchinson's creek. Mr. Andrews has estimated the cost of this intercepting or out-fall sewer at $6,500, which allows for a higher cost per lineal foot than that paid at Schenectady.

Recommendations. This committee therefore recommends that the Board declare the condition of the brook into which Mt. Vernon sewers empty is a nuisance, dangerous to life and detrimental to health, and that the Board advise that it be abated at the earliest possible time, substantially set forth as in the plan of Mr. Andrews herewith appended.

Committee on Drainage, Sewerage and Topography.

JAMES T. GARDINER,
Chairman.
ERASTUS BROOKS,
GEORGE W. COOKE, M. D.,
EDWARD M. MOORE, M. D.,
President.
ALFRED L. CARROLL, M. D.,
Secretary.

At the quarterly meeting of the State Board of Health, February 17th, the above report was submitted, and on motion approved and ordered transmitted to the trustees of the village and the local board of health of Mt. Vernon, as the conclusions of the Board.

ALFRED L. CARROLL,
Secretary.

APPENDIX.

PETITION.

The undersigned, living in and near Mt. Vernon, a village of several thousand inhabitants in Westchester county, ask your attention to a grave sanitary abuse from which many people here have long been suffering. It is of the following nature:

A small but living stream, running through a part of the village, is made to receive the filthy discharges from a sewer which extends through some of the principal streets of the place. The stream is thus rendered foul-smelling, and otherwise disgusting and unhealthy — an open sewer, in fact, during the whole year — and is especially abominable during the warm, dry weather of summer. Those living along its course, both within and outside the village, for a distance of 2,000 or 3,000 feet, are seriously annoyed by the stench arising from it, and the health of many has been injured by its influence.

This state of things has existed for several years. Repeated appeals to the village trustees and the local board of health concerning it have been ignored; and last year the condition of things was made worse by extending the sewers within the village, thus increasing the volume of filth with which the water-course is polluted.

We are the victims of corporate indifference and ignorant stupidity, and having no hope of relief at home, we are compelled to ask that State authority interfere in our behalf.

Christian Von Hesse,	James D. Irwin,
Emily Von Hesse,	Saml. Bernstein,
Mary MacKaye,	Thomas Thorn,
Edward H. Betts,	Wm. L. Marcy,
S. S. Pevear,	G. G. Wagner,
W. J. Youmans,	J. Frank Hull,
B. Franklin Bernstein,	Chas. M. Moseman,

Wm. A. Miles,
Robert Taylor, M. D.,
Geo. S. Miller,
R. D. Watson,
E. A. Youmans,
Edward L. Youmans,
W. R. Austin,
Geo. W. Woosler,
S. L. Close,
A. M. Campbell,
Hiram J. Collins,
H. J. Badenhauser,
B. Hufnagel,
Edw. S. E. Phipps,
W. Koch,
Alfred Cooley,
Charles J. Chatfield,
Wm. Blake,
J. A. Brown,
Robt. Marks,
Peter Sheridan,
Michel Powers,
Patrick Fraley,
John Le Page,
Gustav Schindler,
N. A. Lawlor,
A. E. Crowley,
Joseph Gagg,
William Kortlang,
John Kapp,
George W. Kapp,
Valentin Hinkelbein.

REPORT UPON A NUISANCE AT MOUNT VERNON, WESTCHESTER COUNTY.

JAMES T. GARDINER, Esq., *Chairman of Committee on Drainage, Sewerage and Topography :*

SIR — According to your instructions I have examined into the causes of complaint regarding a nuisance at Mount Vernon, and herewith submit my report.

GENERAL DESCRIPTION OF THE VILLAGE OF MOUNT VERNON.

The village of Mount Vernon is less than fourteen miles by rail from the Grand Central Railroad Depot in New York, and a large number of its inhabitants carry on business in the city. Owing to the ease of access of Mount Vernon its growth has been very rapid of late, the census of 1880 indicating an increase of seventy per cent over the enumeration of 1870. The entire number of inhabitants was 4,586, according to the last census.

The village is somewhat scattering, as there is a tendency toward ownerships of one or two acres or more, but there is a solidly built portion of the village containing at present perhaps as many as 3,000 inhabitants.

In estimating future growth of the village it is safe to predict that the most important increase in numbers will be in the solidly built portion, although the village may become spread over a still larger area than at present, and a considerable growth be evident by an increase in the number of villas and detached houses in the outskirts.

The land upon which the village is situated consists of a number of low hills, of clay in places, and elsewhere of deep beds of gravel. Near the railroad station the land is quite level, and a peat swamp covers several acres.

The streets of the more compactly built portion of the village slope to the north and north-west, the natural drainage being into a small brook which is a branch of Hutchinson's creek.

SEWERAGE OF THE VILLAGE.

About twelve years ago sewers were built in some of the streets for the purpose of readily removing the storm water and that from springs. It was feared by some that these sewers might be used for house drainage, thus causing the effluent to become a nuisance. An injunction was therefore obtained restraining all persons from discharging house waste into the sewers.

At different times the sewers have been extended until they are now about as represented upon the map of the village accompanying the petition.

The main sewer, extending along Fourth avenue, is of brick, oval in cross section and having a greatest internal diameter of about three feet. The sewers along Third and Fifth avenues, which join the main sewer near the railroad station, are of fifteen or eighteen inch vitrified pipe. The Fifth avenue sewer carries the water from springs in the upper part of the village.

The main sewer discharges about 700 or 800 feet north west of the railroad station, the effluent passing along the borders of the peat swamp already mentioned and being considerably augmented by water draining from the west. The course of the small brook thus formed is indicated upon the accompanying map; it flows about a mile and a half from the mouth of the sewer before reaching Hutchinson's creek, the latter soon afterward becoming mixed with the salt water of Long Island sound.

NUISANCE CAUSED BY EFFLUENT FROM SEWERS.

Although, as stated, an injunction restrains the inhabitants from discharging house drains into the sewers, still there have been complaints for the last four or five years as to the foul nature of water discharged from the sewers. It is very evident that rain water flowing from the streets must carry a considerable amount of filth into the sewers, especially where the inhabitants pour waste water into the streets and gutters to a considerable extent. It is also believed by some that neither the liability to fine from a transgression of the law, nor care for the comfort of those residing near the sewer outlet has proved a sufficient motive to prevent some of the residents from discharging their house drainage directly into the sewers.

However filth may get into the sewers, there is no doubt but that it does so, and that the small brook receiving the discharge has been converted from a stream of pure and sweet water into a dirty and vile-smelling open sewer. The health officer, in his last report, says: "The open sewer through the swamp north of the depot cannot but be a source of disease with favorable atmospheric conditions." In June, 1881, the health officer remarks in his report: "It is a question whether great damage has not resulted to many households having connections with the sewers, who, abiding under the delusion that they were only used for water drainage from cellars and the like, have failed to provide proper traps and other safeguards against the invasion of sewer gases into their houses." During the same summer the nuisance arising from accumulations of filth and from offensive waters issuing from the sewers became so great that the health officer presented to the local board of health a remonstrance, signed by a number of citizens of the village, asking for relief. In presenting this remonstrance the health officer, Dr B. J. Burnett, concludes by saying: "Steps looking to the relief of the individuals who are the complainants must soon be taken by the health department of this village to avoid the interposition of the State Board of Health."

At the time of my visit, Monday, December 15, 1884, a heavy rain had occurred within twelve hours, which must have washed out the sewer and have removed surface filth from the streets. It might be supposed that the effluent water would be very nearly clean therefore. The spring water which can be seen near Third street before it passes into the sewer was quite clear and devoid of smell. At the mouth of the sewer, however, there was a very perceptible smell, while the water was much discolored and filled with ropy masses apparently formed by the mixture of soap and hard water. There was no room for doubt that large quantities of soapy water were flowing from the sewer, but whether this came from house-drains or from the emptying of wash tubs into gutters leading to the sewers, is difficult to decide.

In summer time the flow from the springs is quite small and the effluent from the sewer is commonly reported to be very offensive, at such times excrementary matters are said to be frequently visible in the sewer water, and the filthy nature of the muddy deposits along the banks of the brook confirms this statement.

It therefore appears that notwithstanding preventive laws and

complaints from residents of the village for a number of years, the sewers do now receive a large amount of house sewage; that the outlet is so placed that a naturally pure water-course has been defiled and rendered an intolerable nuisance and that repeated appeals to the local authorities have been entirely unavailing in affording relief to those residing along the course of the contaminated brook and to those who may innocently imagine that the sewers are only legitimately used, and hence neglect to provide traps in their cellar drains.

UNSANITARY METHODS OF FILTH DISPOSAL AND DANGERS TO BE APPREHENDED IN FUTURE.

Throughout the village of Mt. Vernon the generally adopted manner of disposing of house waste, and the only legal one available, consists in the use of the ordinary cess-pool and privy vault. Up to the present time there has been no public water supply and those who unfortunately live in the more densely settled part of the village must have been compelled to use wells more or less contaminated by the leachings from their own and neighbors' cess-pools.

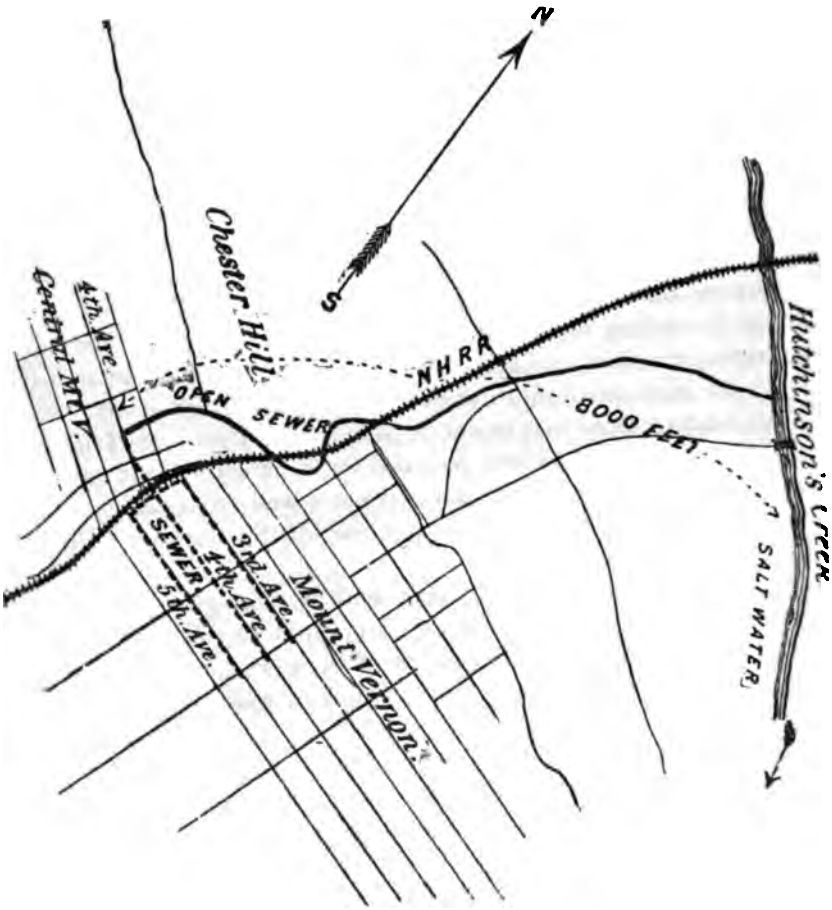
The health officer in a recent report to the Board of Trustees states that: "Within an area bounded by First and Second streets and Third and Sixth avenues, there is not a well from which it is safe to use water. The soil in a large part of this territory is sewage-soaked to saturation."

An artesian well has recently been sunk in the higher part of the village, and at the time of my visit water-pipes were being laid, by which those residing along the course of the sewers, as well as many others, will doubtless soon receive a supply of water very much to be preferred to that furnished by the wells.

When the new water supply comes into use the cess-pools, which are even now inadequate, will soon cease to contain the extra amount of water which will be poured into them. If the ground is now "sewage soaked to saturation" it will be an absolute necessity to provide some proper means of sewage disposal as soon as an abundant water supply comes into use.

PROPOSED REMEDIES.

There would seem to be no practicable means of remedy for the evils that have been the subject of complaint in the present petition except an effective system of sewerage. It is very doubtful if the nuisance complained of is of so dangerous a nature to the inhabit-


N
S
Chester Hill
4th. Ave.
OPEN SEWER
NHRR
8000 FEET
Hutchinson's Creek
SALT WATER
SEWER
3rd. Ave.
4th. Ave.
5th. Ave.
Mount Vernon

ants of Mt. Vernon as the complete saturation of their soil with filth from their drains. Already this latter evil is of appalling magnitude and no action can be too quickly taken to abate it.

Plans of sewerage of very great and indefinite expense have been made, and it is doubtless owing to the apparent magnitude of the undertaking that the inhabitants have for so long time suffered their health to be imperiled and the good name of their village to be brought in question.

The portion of the village that most needs sewerage is all situated on one drainage area and there is no reason why a system cannot be devised for it at once, leaving other portions of the village, which are but sparsely settled, until future needs may require other systems for them also. Without an abundant water supply it would have been useless to consider any means of sewerage, since the modern sewer is intended for the removal of household waste by means of water, but now that there is reason to believe that a liberal supply will be available there is no excuse for deferring action.

In Mount Vernon the present sewers remove the storm-water in an expeditious manner and seem to answer the purpose of their construction. The question to be considered is whether the present sewers can be so extended and otherwise improved as to remove house-waste and the ordinary sewage of the village, or whether it will be better from sanitary or economical reasons to adopt a separate system of sewers for removing sewage proper, allowing the present storm-water sewers to remain, and compelling the inhabitants of the village to use them for their legitimate purpose only.

If the present sewers are to be used for the reception of house-waste it will be necessary to provide some other outlet than the present one and the only one that would appear to be at all practicable would be by means of an extension of the main sewer to the point where Hutchinson's creek meets the salt water. By discharging the sewage, at this point, where the volume of water in the creek is considerable, the sewage would probably occasion no trouble until the village had grown to a much larger size than at present.

The objections to this extension of the main sewer would be that the cost of laying this large main a distance of from 8,000 to 10,000 feet would be very great and in dry weather the flow through it would be quite small, so that a very large extent of surface within the sewer would remain covered with filth, emitting noxious vapors to the annoyance and detriment of health of the village. If the village should further commit itself to the use of large sewers, hav-

ing the combined objects of the removal of storm-water and house drainage, the system will become a heavy burden to the community for frequent extensions will be called for to remove house-waste in places where there will be no trouble from storm-water for many years.

THE SEPARATE SYSTEM OF SEWERAGE.

To properly remove sewage from the village there would seem no other alternatives than to build an outlet sewer of considerable length or to discharge the sewage into settling tanks where it could be disinfected if necessary and the sludge, precipitated by chemicals, could be removed while the clarified effluent could flow off as at present. In either of these plans it would be desirable to exclude storm-water from the sewers, in order that in the first plan the diminished size of pipe may reduce the cost to a minimum, and in the second, the sewage may be as little diluted as possible.

It has been proposed that the sewage should be removed by allowing it to flow on suitably prepared land in the neighborhood of Pelhamville, but this plan appears wholly unsuitable for the case under consideration, since land is everywhere held at a high price, and there would be loud remonstrances against converting any land adjoining possible villa sites into a "sewage farm."

About one acre would be needed for every one hundred persons in the sewage farm suggested; from twenty-five to thirty acres would therefore be needed at present, which, with the necessary expense of preparing the land, would make this a very costly plan.

Although at some places the expense of operating sewage farms has been partially borne by the increased amount of crops, still, as far as past experience can be taken as a criterion, sewage can neither be utilized as a manure nor purified by intermittent filtration without considerable expense.

Where the principal value of land is that which it possesses as a site for residences, almost any other sanitary method of sewage disposal should be preferred to that of irrigation.

Taking all facts into consideration, it would seem to be the best as well as the cheapest plan to lay a twelve-inch pipe approximately along the course of the small brook, whose contamination is now the cause of complaint, until the sewage can be discharged into Hutchinson's creek at or near the point to which the tide rises. If the growth of the village should in future be so great that a perceptible nuisance would be caused by the discharge of the sewage

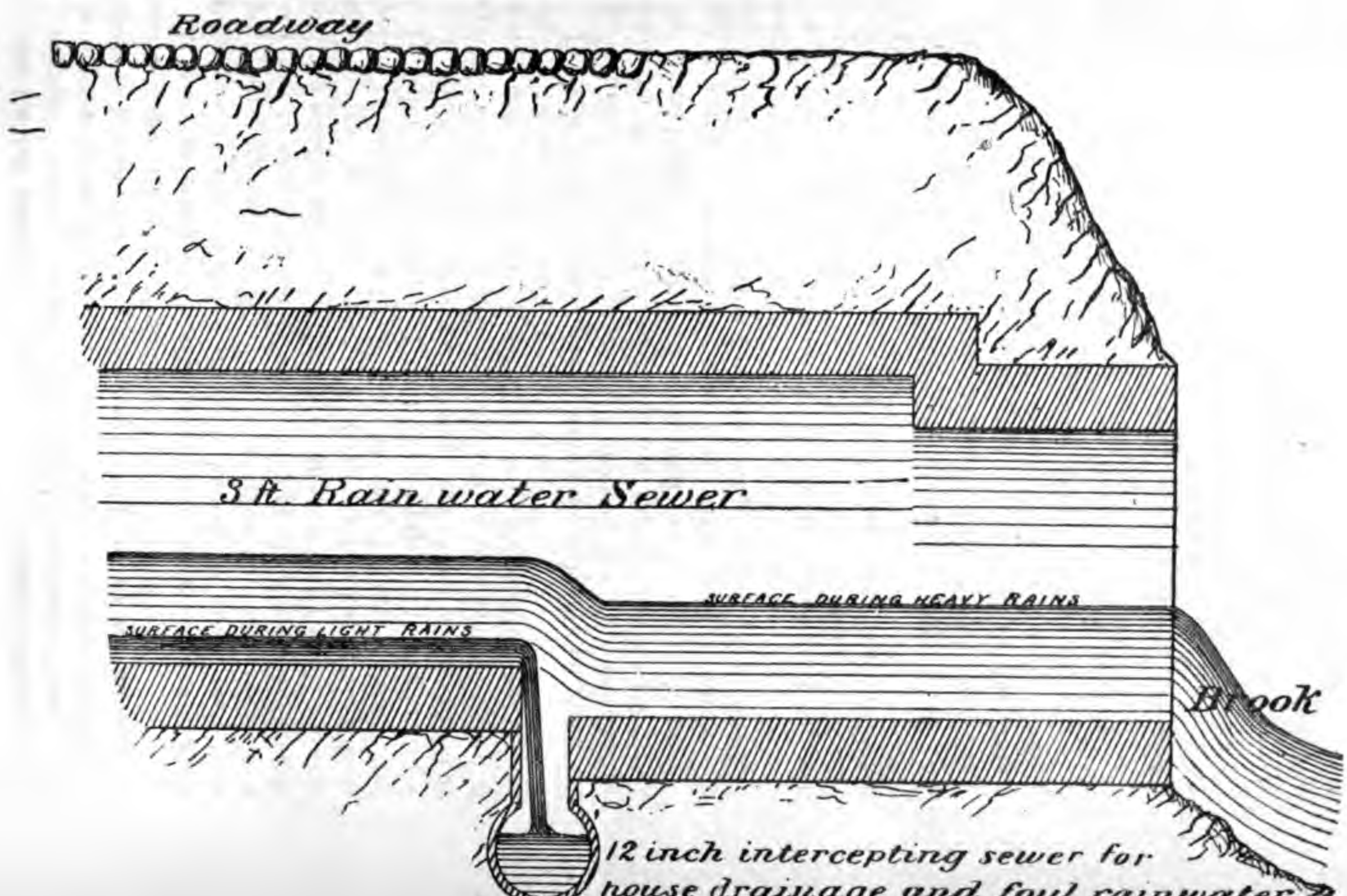
in the manner indicated, it could then be brought into tanks and precipitated and deodorized. Six or eight-inch lateral pipes would be needed in the main streets of the village with flushing tanks at their ends while the present sewers would remain to drain off the storm-water and to dry the subsoil as they now do.

It is not necessary to describe the separate system of sewerage in detail, as its main features are well known; it would seem to be peculiarly applicable to Mt. Vernon, as there does not appear to be any way to escape the use of an outlet pipe of considerable length, and the smaller the size of this pipe the less costly would the sewage removal be. The separate sewerage system has besides, many points to recommend it in a village like Mt. Vernon. From a sanitary point of view the small, well flushed pipes of the separate system would be much preferable to the large sewers of the combined system, which would in general carry only a very shallow stream of water and would emit disagreeable and unhealthful odors from which the separate system is nearly free.

The cost of the separate system would undoubtedly be much less than that of any other that could be devised, the principal expense being for the long outlet pipe. Careful surveys are needed before the actual length of outlet pipe required can be definitely known, but it would be cheaper to use such an outlet than to attempt to precipitate the solid matters of the sewage. The precipitation of sewage would require careful attention by some one instructed in the requirements of the case. Probably a number of years will elapse, before Mt. Vernon is of such a size as to render its sewage precipitation necessary for the health of those living near the mouth of Hutchinson creek.

A rough estimate of the expense involved in laying a twelve-inch pipe from 8,000 to 10,000 feet in length, with the necessary manholes would be $6,500, while the duplication of the existing sewers by six-inch pipes, together with ten manholes and three flushing tanks, would amount to about $7,000 more. Future extensions of the sewers would involve less outlay than would be possible with any other system.

The entire abandonment of cess-pools and privies in the thickly settled portions of the village is certainly called for, as they are now saturating and polluting the subsoil and poisoning the air in the houses. Strict ordinances are needed relating to cess-pools and privy vaults, not only for the preservation of health of those residing in the central portion of the village, but also for improving the sani-


Roadway
3 ft. Rain water Sewer
SURFACE DURING HEAVY RAINS
SURFACE DURING LIGHT RAINS
Brook
12 inch intercepting sewer for
house drainage and foul rainwater

tary condition of those parts which may be without sewerage for a number of years to come, and where wells may still be in use after the introduction of the new water supply.

TEMPORARY EXPEDIENTS.

If the separate system of sewerage should be adopted at Mt. Vernon, it would be possible to obtain relief from the nuisance that is the occasion of the present petition by merely constructing the long outlet pipe, which would remove contaminated water to a point where it would occasion no trouble. Afterward the laterals, flushing-tanks, etc., could be added as occasion requires.

This temporary plan would call for the admission into the new outlet pipe of the ordinary dry weather flow from the present sewers, and also the first flow from the streets during a rain. The nearly clean water flowing out of the sewers, when the rain fall became heavy, could pass into the brook as at present. Even with the completed separate system of sewers, the first flow from the streets during a rain storm might well be admitted into the small outlet pipe, since the first water flowing from the streets, at the commencement of a rain, will be very nearly as impure as any other sewage.

The device that could be used to secure the admission of the dry weather flow from the present sewers, until the laterals are built, and the first part of any rain fall, would be a very simple one, as indicated in the annexed diagram.

At the point where the sewers cross, an opening is made in the bed of the rain-fall sewer and also in the crown of the intercepting sewer. Knowing the inclination of the rain-water sewer, the size of the openings can be adjusted and the steps in the large sewer fixed so that any given amount of rain water may be taken into the twelve-inch sewer.

The amount that should be received into the small sewer will depend upon the pitch of the latter and its consequent capacity. During a heavy down-fall of rain, the velocity of the flow in the large sewer will be so great that none or very little will enter the twelve-inch sewer.

In very dry weather it is estimated that only three-tenths to four-tenths gallons per second flow through the present sewer, while a few days after heavy rains the quantity was only six gallons per second, or 50.4 cubic feet per minute. A twelve-inch sewer with an inclination of only one in five hundred would carry twice the latter amount.

By the arrangement described, all contaminated waters would b excluded from the brook, and it would cease to be a nuisance to th residents of Mt. Vernon, while the outlet could for many years t come be used for the sewage of all that portion of the village th will need provision for its disposal, after the necessary laterals a provided.

Very respectfully,
HORACE ANDREWS, JR., C. E.

ALBANY, *January* 31, 1885.

B.

James T. Gardiner, Esq., *Chairman of Committee on Sewerage, Drainage and Topography of the New York State Board of Health:*

Sir — In accordance with your instructions, I visited Mount Vernon April 23, and submit the following report on the sanitary condition of the village as I found it, and inclose various extracts of the village ordinances; an extract from the report of the present health officer, Dr. E. F. Brush, dated December 16, 1884, a plan for sewering the village made by S. Towle, C. E., in 1882, and an opinion on the same by J. W. Adams, C. E., 1883, the two latter containing statements pertinent to the present report. Horace Andrews, Jr., C. E., made a report to your honorable committee on the same complaint in January last, which I fully indorse and will only supplement as to the present condition of the village requires.

Water Supply.

Until this spring the source of water for drinking and culinary purposes has been from ordinary wells, which is always a dangerous source in any village. A water company has recently been organized and has put down an artesian well 500 feet deep near the corner of Third street and Seventh avenue. A water main has been laid from the well through Third street to Fourth avenue, thence along Fourth avenue to the New Haven railroad. About three-fourths of the residences along this route are using the water and others have applied for connections. Water mains will be laid in other streets this season. The water seems pure and is soft enough for laundry purposes.

Sanitary Condition of the Village.

Were a person ever so skeptical as to the desirability of having a supply of good water and a system of sewers in a village of 3,000 inhabitants living on a small area, an inspection of this otherwise beautiful village would convince him that they are not only desirable, but really necessary to the enjoyment of life and health. The village authorities have passed certain sanitary ordinances and regulations

which are creditable to them, some of which are given below. They seem to be ignored by many of the inhabitants, and their violation overlooked by the authorities.

[Extracts from the Sanitary regulations of the Board of Health of the village of Mt. Vernon.]

ORDINANCES.

AN ORDINANCE IN RELATION TO THE REMOVAL OF NUISANCES.

The Trustees of the Village of Mount Vernon do ordain as follows:

It shall be the duty of any person, owner or occupant on whose premises any nuisance may be found, to remove or abate the same. And any such person or persons who shall fail to remove or abate such nuisance forthwith on receiving notice from the president of the village or a committee from this board, shall be subject to a fine or penalty of five dollars, together with the cost of removal or abatement when done by this board.

Approved September 14, 1875.

AN ORDINANCE IN RELATION TO CONNECTION WITH DRAINS.

SECTION 1. No connections or openings shall be made with any pipe, brick or stone drain or sewer, without permission first having been obtained from the board of trustees, or from such officers of the village as may hereafter be empowered to grant permits therefor.

§ 4. No person having been granted a permit to connect with any drain, shall fill in around the same until it has been inspected, and the connection approved by such person as the trustees may appoint for the purpose.

§ 5. All drains from houses or lots shall have a suitable and proper trap at a point inside the line of such houses or lots.

§ 9. No permit shall be granted authorizing the use of any drain for sewage purposes, nor shall any drain be used for such purposes.

§ 10. All persons, owners and workmen violating either of the provisions of this ordinance shall be liable to a penalty of twenty-five dollars.

Approved November 29, 1875.

PUBLIC REGULATIONS.

At a meeting of the board of health of the village of Mount Vernon, held on Tuesday evening, February 14, 1882, the following sanitary ordinances, regulations and orders were unanimously adopted, viz.:

CHAPTER II.

OBEDIENCE TO ORDINANCES.

Section 1. That the health officer, under direction of this board, is empowered to make and shall make the necessary inspections and examinations, and shall have power to enforce compliance with the orders, regulations and ordinances of the health department, whenever necessary; and that said health officer shall act summarily when the public health so demands it. That the police officers shall execute all orders of this board and the health officer, whenever so required; and all persons are forbidden to interfere with or obstruct such inspection, examination and execution that the said health officer or police officers shall undertake to perform in obedience to the order of this department, said interference being a direct violation of law and punishable therefor.

§ 4. No person shall impair or imperil the purity or wholesomeness of any water used for drinking or culinary purposes in the village of Mount Vernon.

Section 1. That no owner, lessee or keeper of any tenement or boarding-house or factory shall allow the existence of any nuisance or any thing injurious to the inmates thereof, detrimental or dangerous to the public health and safety. All sewers or drains that pass within fifty feet of any source of water used for drinking or culinary purposes shall be water tight. Any violation of this section shall subject the offender to a penalty of twenty-five dollars.

§ 2. That no privy-vault or cess-pool shall hereafter be constructed within the limits of Mount Vernon unless the side walls and bottom of the same are of brick or stone, laid water tight in good cement, nor shall they be within thirty-five feet, or, where practicable, within fifty feet of any well, spring or other source of water, used for drinking or culinary purposes, or within three feet of the line dividing the property of respective owners; and no privy-vault now existing or hereafter to be built shall be allowed at less than fifty feet distant from any public avenue within the limits of Mount Vernon village, unless otherwise specially granted by permit from this board. A violation of this portion of this section shall subject the offender

to a penalty of twenty-five dollars. And every privy-vault and cess-pool shall be cleaned and the contents thereof removed at least once before the first day of May, annually. Any violation of this portion of this section shall subject the offender to a penalty of ten dollars.

§ 3. All cess-pools hereafter constructed shall not be less than eight feet in depth and provided with a cover so constructed as to allow of free ventilation and admission of occasional disinfectants and removal of its contents. Privy-vaults shall not be less than four feet in depth.

§ 4. It shall be the duty of all persons occupying houses or parts thereof, for living or other purposes, wherein exist sinks, water-closets, waste-pipes and traps of such, to keep the same in a thorough state of cleanliness; and all owners, lessees, or agents of any house shall see that all waste-pipes, traps, sinks, water-closets, cess-pools, privy-vaults and drainage of such premises are kept in a thorough state of repair. A violation of this section shall subject the offender to a penalty of ten dollars.

§ 5. No owner or lessee shall allow any stagnant water, filth or rubbish at any time of any kind to remain on his or her premises; neither shall said parties allow any dead carcasses or other unwholesome substances to remain upon his or her premises, within the limits of said village, but shall promptly remove or bury the same not less than three feet below the surface in every instance. Neither shall any person permit water, slops or filth of any kind to run from his or her lot into any street or avenue in said village, excepting such water as may result from rain or snow. A violation of this section shall subject the offender to a penalty of ten dollars.

§ 6. No owner, manager, agent or corporation shall allow the existence of any nuisance on or within the limits of any building or other premises over which they have control, within the limits of the village of Mount Vernon. And all water-closets, water and waste pipes, privies and cess-pools that may exist on said premises controlled by said owner, manager or agent or corporation shall be kep in a thorough state of repair and in a healtful condition, under penalty of ten dollars for each and every violation of this section.

§ 7. It shall be the duty of every contractor or person, his agent or employees, who have contracted and engaged to remove any dea diseased animal, rubbish, garbage or filth, or the contents of an privy-vault, cess-pool or other noxious substances, to do the sam with dispatch, in a manner as cleanly and as little offensive an with as little danger and injury to life and health as possible. An the contents of all privy-vaults and cess-pools shall be removed du

ing the annual period mentioned — section 2 — and between the hours of 11 P. M. and 4 A. M.; the said contents shall be carried away in water-tight tanks and well covered. A violation of this section shall subject the offender to a penalty of ten dollars.

§ 8. The work of emptying and cleansing said privy-vaults, cess-pools and the like shall be performed *only* by such persons as shall be licensed to do the same by the proper authorities of this village, and in accordance with the instructions and restrictions above mentioned, and in all cases previous to said work being undertaken or performed, a permit from the board of health, indorsed by the health officer, shall be first obtained by the public scavenger. Any violation of this section shall subject the offender to a penalty of ten dollars.

SECTION 1. Any non-observance or violation of any of the rules, regulations or ordinances herein made or hereafter to be made by the said board of health of the village of Mount Vernon shall be punishable by the imposing of penalties heretofore specified or prosecution for misdemeanor as provided by law.

FROM LAST ANNUAL REPORT OF THE VILLAGE HEALTH OFFICER.

Mr. President and Gentlemen of the Board of Trustees:

The chairman of your committee on health has asked me to make a report to you on the present sanitary condition of our village, and also what action, in my opinion, is required to improve our surroundings and make us ready to combat cholera and any other contagious disease or epidemic which may arise.

We have passed through a remarkably healthy summer. Our death-rate has been low; and, with the exception of a few isolated cases of scarlet fever and diphtheria, we have not had any epidemic diseases. Just now there is more sickness than at any other time during the year. Scarlet fever, at present, in a mild form, has appeared in several parts of the village and seems to be spreading. The physicians, as a general thing, notify me of contagious diseases occurring in their practice. In cases where the danger of spreading the disease appears at all likely, I have visited the residence of the afflicted, and enjoined those in charge to use more than ordinary care. But it is hardly to be expected, with the present state of the weather, and the bad sanitary conditions of some localities in our

village, that we can escape an epidemic. And if, as seems very probable, cholera reaches this country, we will only escape by fortune, or a better sanitary condition and the endowment of more prompt means than we have at present to meet an emergency. It is safe to say, that within an area bounded by First and Second streets and Third and Sixth avenues, there is not a well from which it is safe to use water. The soil in a large part of this territory is sewage-soaked to saturation. There is no ordinance now in force relating to privy-vaults. I am aware that a code was adopted some time ago, but by a body declared illegal by your counsel. The open sewer through the swamp north of the depot cannot but be a source of disease with favorable atmospheric conditions. With a large number of buildings continually going up, there is no supervision of the construction of vaults or the location of wells; and this neglect we will undoubtedly suffer at no distant time.

In the meantime I would respectfully report to you, for immediate abatement, the nuisances existing in the rear of the brick buildings on the west side of Fourth avenue. An old blind sewer ditch is choked and overflowing, especially in the house of Mr. Bernstein, clothier. The wells are contaminated by it, and there is a large accumulation of ashes and garbage in some of the yards; this matter should be attended to during the cold weather, as the disturbance of the supersaturated soil would be capable of creating an epidemic if it should be disturbed during the hot weather.

Respectfully submitted,
E. F. BRUSH, M. D.,
Health Officer.

Dec. 16, 1884.

A system of sewers for storm water is laid in Third, Fourth and Fifth avenues and joined in First street. A village ordinance imposes a fine of $25 for emptying sewage into these sewers. That such sewage finds its way into these sewers there can be no doubt. I was informed by several residents that the following is one way in which this is accomplished, though, of course, their sewage was not connected but they could and did mention names of parties who, they would make affidavit, did do so. A resident asks permission to connect a drain from a damp cellar with the street sewer which shall also carry the overflow from the cistern or rain water from the roof. This is readily granted. He has a cess-pool and privy-vault already

connected with each other. The sewer drain is led to the cess-pool and the rain water is turned into the privy-vault, so the surplus rain water find its way to the sewer through said vault and cess-pool. Direct proof against an individual can only be obtained by excavating and following up the connection from the sewer.

Many of the privy-vaults are inside or very near the dwellings and are very offensive. One of these in the block between Fourth and Fifth avenues on First street, although cleaned a few days before, was so noisome as to attract attention passing in the street. In justice I would state that a minority of the trustees are in favor of better sanitary inspection, but seem powerless.

A small brook running from a spring-hole near Fourth street and Eighth avenue in a direction a little north of west emptied formerly into the marsh near the present sewer outlet. It was the practice to empty house drains into its channel and set privies over it, when possible, especially below Second street. The extension of the pipe sewer up Fifth avenue intercepted this stream near Second street. The old channel with its connections now lies — covered lightly — in the block bounded by First and Second streets and Fourth and Fifth avenues and is a vile nuisance. A clothing dealer on Fourth avenue in extending his store intercepted this drain, and as a consequence has sewage in his cellar and seems helpless to rid himself of it. This nuisance should be abated immediately by the health officer, who mentions it in his report.

The New Haven railroad maintains a nuisance along the track where the drain emptying the contents of the depot privies ends. This drain should be continued to the brook and connected with the sewer proposed below.

These nuisances are mentioned here incidentally, not as being all that need immediate attention, but as coming under my personal observation during a stop in the village inspecting a complaint connected with the sewage disposal of the system ending north of the depot in the edge of the

PEAT SWAMP.

There is a peat swamp or marsh containing about eighteen acres lying north of the New Haven railroad and east of Fourth avenue, partly in the corporation of Mount Vernon and partly in the suburb of Chester Hill. It is of the same character as many others in this county, being originally a lake gradually filling up with peat and other vegetable matter. In one portion a rod has been pushed down thirty-six feet without meeting with much resistance, the peat runs

gradually thinner toward the edges of the marsh. Third avenue has been partially graded through the marsh with the effect of dividing it into ponds of stagnant water. Surrounded as it is by residences, lying so close to the thickly settled portion of the village, and receiving so much sewage and filth, renders it a nuisance detrimental to public health. It can be readily drained, there being twenty feet fall in the outlet within half a mile. I understand a law enabling the village to obtain and improve it as a park is talked of. It should be drained as soon as possible without waiting for the legislation just referred to.

Near the south-west corner of this swamp the present sewer outlet is located, about 400 feet north of the New Haven depot and fifty feet east of Fourth avenue; from here the sewage flows sluggishly through an open box sewer about four feet wide and two feet deep for a distance of about 800 feet, where it joins a larger stream of spring water from the north-west and flows easterly to Hutchinson's creek. It is this brook, from the sewer outlet toward the creek, flowing as it does near residences, that has caused the present complaint.

This brook passes out of the corporation of Mount Vernon into the suburb of Chester Hill, thence into the town of East Chester proper, which rather complicates the matter of jurisdiction. I took a sample of water from the brook near the point where it disappears in a covered drain at the corner of Third street and Sixth avenue, where the stream would pass through a pipe one inch in diameter at the time of my visit. Also samples of the sewage at the sewer outlet, where the flow was at least fifty times as great. The contamination of the water between these points is very apparent both to the eye and nose. The samples were taken on Thursday at 3 P. M., which is not the time the cess-pools would usually be flushed with laundry waste-water, nor the time of day when fœcal matter would usually be most prevalent. As there had been no rain for many days street washings and other gutter filth would be less liable to be in the sewage.

There was an offensive odor arising at and below the sewer outlet, while solid matter nearly covered the surface of the stream and was seen clinging to pebbles and other points in the channel all the way down for over half a mile. At places where the sun shone on the brook bubbles of gas rose from the sediment in the bottom, showing conclusively that fermentation was going on. The present health officer was out of town, but I met his predecessor, Dr. B. G. Burnett,

sor of New York, who was health officer from 1880–3. He informed me that he had issued burial permits, when in office, for at least thirty cases of death from bronchial consumption, scarlet fever, typhoid fever, dysentery, bloody-flux and diphtheria, most cases attributed by him to the unsanitary condition of this part of the village. With a public water supply more water will be used, the ground will become more saturated with filth, and to a greater depth which will tend to make the use of common wells, by those who cling to them, more dangerous than at present, and they should be abandoned in the more thickly settled portion of the village.

Proposed Remedy.

I heartily approve the recommendation of Mr. Andrews as to the intercepting sewer to remedy the cause of this complaint. The village should adopt the separate system of sewers and disconnect all house drains from the present system. The water supply now furnished will provide water for the necessary flushing tanks. This intercepting sewer must necessarily pass through what is now private property. It will be well on this account, as well as to avoid rock excavation as much as possible, to lay this sewer near the channel of the present brook, through and near the village. I was informed that the right of way for the sewer would be gladly given by the various owners along the brook. I would call attention to the reports of Messrs. Andrews, Adams & Towle, as to the present need and advantages for sewage precipitation, when desirable, near Hutchinson's creek.

Resoectfully submitted,

O. S. WILSON, C. E.

April 25, 1885.

Laboratory, Albany Medical College,
Albany, N. Y., *April* 27, 1885.

James T. Gardiner, Esq., *Chairman of the Committee on Drainage of the State Board of Health, Albany, N. Y.:*

Dear Sir — Agreeably to your instructions, I have made an analysis of the contents of the demijohn secured from you on the 24th inst., and labeled "sample of sewage of Mount Vernon, taken at 3 P. M., April 23d."

A gelatinous scum floated upon the surface, and the liquid had an opalescent appearance, and a slightly greenish color when viewed in a two foot tube. It was translucent, but not transparent.

At 100° Fahr., its odor was fetid and highly disagreeable.

The results of the analysis are as follows:

	Parts per 100,000.	Parts per Million.	Grains per U. S. Gallon.
Chlorine	7.40	74.00	4 32
Free Ammonia..................	0.5700	5.700	0.3327
Albuminoid Ammonia	0.2550	2.550	0.1488
Organic and Volatile matter......	21.40	214.00	12.49
Mineral matter..................	22.90	229.00	13.37
Total solids	44.30	443.00	25.86

I should consider this liquid to be sewage in the sense that the word "sewage" is ordinarily employed, basing the opinion upon the sensible properties and the results of the chemical analysis of the fluid.

Yours very respectfully,

WILLIS G. TUCKER.

ALBANY MEDICAL COLLEGE,
ALBANY, N. Y., *April* 24, 1885.

DEAR SIR — Examination of sample of sewage from mouth of sewer, Mount Vernon, April 23, 1885, I find: It is a highly putrescent fluid, very foul and offensive, with a distinctly fœcal odor and considerable solid matters in suspension. It contains 8.75 of chlorine in parts of 100,000. It is swarming with numerous forms of scavenger bacteria and infusorial life; there is also a large amount of decaying vegetable and animal matters present.

Such a noxious compound is certainly dangerous to public health (under favoring circumstances it would spread contagion far and wide). Its proper disposal should demand immediate attention.

Very truly,

WM. HAILES,

Albany Medical College.

JAMES T. GARDINER,

Director of State Survey.

POLLUTION OF THE WATER SUPPLY OF BINGHAMTON BY THE SEWAGE FROM THE INSANE ASYLUM.

OFFICE OF HEALTH OFFICER,
BINGHAMTON, N. Y., *February* 20, 1885.

ALFRED L. CARROLL, M. D., *Secretary State Board of Health:*

DEAR SIR — Numerous complaints having been made in an informal manner to the Board of Health of this city concerning the emptying of sewage from the Chronic Insane Asylum, located near this city, into the Susquehanna river, the Board, at its last meeting, directed me to communicate with you as Secretary of the State Board of Health concerning it. The asylum is situated two miles east of the city on an eminence near the river. About midway between that and the central portion of the city is situated the water-works, which supply the city with water. The water for the city's supply is taken partly from wells and partly from the river, and a portion of the time, as is the case at the present, a large portion is taken from the river. The sewer from the asylum empties into the river about a mile above the water-works, where the supply of water for the city is taken from the river. The asylum at the present time contains between 600 and 700 patients besides the attendants and attaches, which will probably make the number of persons in the institution at least 700, and the prospects are that, with increased facilities for accommodating a larger number, there will, in the near future, be not less than 1,000 or 1,500 inmates of the institution. From the sewage of so large a number of persons entering the river so near the city, and its source of water supply, our citizens are becoming alarmed as to its effects upon the lives and health of the people, and are asking from the local Board of Health some relief from the dangers which seem to be threatening them. Now what this board of health wants to know is what is necessary to be done, or in what manner to proceed to prevent this sewage being emptied into the river at the point and in the manner that it is. The asylum property being State property, complicates the matter somewhat in the minds of members of this board, and hence their directions to me to communicate with the State Board of Health for instruction in the matter. The prospect of cholera making its appearance in this country the coming season makes them feel the necessity for vigilance in the matter of prevention.

An early reply, with such instructions as you may give, is earnestly requested.

Very truly yours,

C. D. SPENCER, M. D.,

Health Officer and Secretary Board of Health.

COMMITTEE'S REPORT.

In the latter part of February last, the board of health of the city of Binghamton appealed to the State Board of Health to investigate and report on the pollution of the Susquehanna river, by the sewage from the Asylum for the Chronic Insane, located about two miles above the city, and near the bank of the stream.

Some two years ago when an outbreak of so-called winter cholera occurred at Binghamton, the defilement of the river by sewage entered into the investigation.

The physicians at Binghamton state that more or less uneasiness and alarm are felt in the city, concerning the purity of the water supply, and that this uneasiness is readily increased whenever epidemics of zymotic character occur. The fact that sewage is being emptied into the river within two miles of the water-works is considered a standing menace to the health of the city.

In response to the application of the local board of health, Horace Andrews, C. E., was sent to investigate the facts, and his report is hereto appended.

It appears that "for a number of years the supply of water of Binghamton has been obtained from two large wells situated on the northern bank of the Susquehanna river and east of the city. Although the wells are only about one hundred and fifty feet from the river, there is reason to believe that the water running into them does not filter in from the river, but comes from the north and flows toward the river."

In other words, Binghamton has been supplied with the ground-water of the Susquehanna valley, but owing to the rapid growth in population and the increased consumption of water, the ground-water can no longer be relied upon to furnish sufficient quantities for the use of the city; so that a supplemental supply must be obtained by pumping directly from the river, and indeed the river has already been drawn upon when the ground-water has been insufficient. In future the city must depend upon the river for an increasing proportion of its water; so that the question of purity of the stream becomes of much greater importance than it has been in the past.

In 1883, when Emil Kuichling, C. E., examined the sanitary condition of Binghamton for the State Board of Health, he reported that the river was being defiled by the sewage from the Susquehanna Valley Orphans' Home, the sewer from which enters the river half a mile above the pumping station. Mr. Andrews finds that the sewage from the orphanage is still allowed to drain into the river. We recommend that this should be stopped. The local health authorities should see that the sewage from the Orphans' Home is disposed of in some other manner than by draining it into the Susquehanna river.

One and seven-eighths miles above the pumping station the filtered sewage from the Asylum for the Chronic Insane, a State institution, is allowed to enter the river, the quantity being some sixty thousand gallons per diem. The institution contains six or seven hundred inmates besides the officers. It is regarded as probable that the inmates and officers may be increased to from twelve to fifteen hundred in the future.

At a point five or six hundred feet from the main building the sewage is filtered through about five feet of charcoal. The filter is said to be changed every six months. The character of the effluent as it flows from the filters of the institution shows that it still contains a very large amount of putrescible material, and is only purified so far as the suspended matter in it is concerned, while the large proportion that is soluble passes on to the Susquehanna river.

A quarter of a mile below is situated the pumping station for the water supply of the insane asylum. Exactly what the low water flow of the Susquehanna river is we have been unable to ascertain: but it is already small and is probably annually decreasing, while the sewage from the asylum must continue to increase. We are clearly of the opinion that the sewage from the asylum is a possible source of danger to the water supply, both of the asylum and of the city of Binghamton, and that, in its present state, it should not be allowed to enter the Susquehanna river above the points of in-take for these water supplies.

At the request of the committee, Mr. Andrews considered the question of the purification of sewage by irrigation and by chemical treatment, as compared with its disposal through a drain entering the Susquehanna river below the pumping station. He finds, that the ground is not well adapted to irrigation. Even if irrigation were practicable, the condition of the effluent from the sewage farms

in England does not justify the admission of the purified sewage into a stream which is used as a water supply.

As regards chemical treatment, Mr. Andrews finds that the annual cost of treating the sewage would probably be from $6,000 to $9,000; that is to say, this would be the amount of capital required to be placed at interest in order to furnish the sum annually needed to defray the cost of chemicals and labor and to pay for the tanks. Were there no other method of disposal, purification by chemical treatment would certainly be a great improvement on mere filtration, as used at present; but even chemical treatment does not so purify the effluent that it can be turned into a stream used immediately below for drinking purposes.

It seems that the insane asylum is so situated, that the sewage can be discharged into the Susquehanna river below the Binghamton dam by a vitrified pipe from eight to nine inches in diameter and some 14,000 feet long. Here the sewage would enter the river at a point where it is already contaminated by the sewers from the city of Binghamton, and no additional harm could be done to the stream. It is not known that within the limits of this State the river is used for drinking purposes below this point. The estimated cost of laying this pipe is $8,160, to which for safety Mr. Andrews adds twenty-five per cent to cover contingencies, making a total of $10,000.94.

The difference between the estimate of cost of this outfall sewer and that for a method of chemical purification is slight; while the advantages are greatly in favor of the outfall sewer which will furnish a complete and permanent means for disposing of the sewage of the insane asylum in such a way as to prevent all question regarding the pollution of the river.

RECOMMENDATIONS.

First. In view of these facts we recommend that the authorities in charge of the Binghamton Insane Asylum construct an outfall sewer of vitrified pipe, in accordance with the report of Mr. Andrews, to deliver the sewage of the asylum at a suitable point below the Binghamton dam.

Second. We also recommend that the local health authorities having jurisdiction prevent the discharge of sewage from the Susque-

hanna Valley Orphan Home into the river above the water-works' in-take.

Respectfully submitted,

JAMES T. GARDINER, *Chairman*,
ERASTUS BROOKS,
GEORGE W. COOKE, M. D.,
EDWARD M. MOORE, M. D., *President*,
ALFRED L. CARROLL, *Secretary*,
Committee on Drainage, Sewerage and Topography.

At the meeting of the State Board of Health on the 11th February the above report was presented and adopted by the Board.

ALFRED L. CARROLL,
Secretary.

Engineer's Report.

James T. Gardiner, Esq., *Chairman of Committee on Drainage, Sewerage and Topography:*

Sir—In accordance with your instructions I have examined into the conditions that have recently been the subject of complaint to the State Board of Health from the health officer and board of health of Binghamton. My report as to the facts observed and suggestions as to a remedy for the evils that are manifest are herewith submitted.

The Water Supply of Binghamton.

For a number of years a supply of water has been obtained from two large wells situated on the north bank of the Susquehanna river and just east of the city. Although the wells are only about 150 feet from the river, there is reason to believe that the water running into them does not filter in from the river but comes from the north and flows toward the river. Attempts to increase the water supply by driving pipes into the bottoms of the wells to various depths have only been moderately successful. A third well, 179 feet long and ten feet wide, was dug in 1883, just east of the pumping-works, but it has not increased the supply as much as was anticipated. There have been times, occurring occasionally for a number of years, when, either on account of drought or excessive consumption of water, it has been necessary to draw water directly from the river. There is no reservoir connected with the pumping-works, the water being kept under a constant pressure in the mains by the pumps, according to the Holley system. It is, therefore, quite necessary to the welfare of the city that an abundance of water should be always available at

the pumping-works. Binghamton is steadily and rapidly increasing in size. Its population since it was incorporated in 1867 has been as follows:

1870	12,692	inhabitants	
1875	15,518	do	
1880	17,315	do	
1885	19,500	do	(estimated).

In addition to the increased consumption of water due to the growth of the city, the further completion of the system of sewers that are now being built will undoubtedly make still more heavy demands upon the supply. In view of these facts the water commissioners feel compelled to regard the Susquehanna river as the source from which a large and increasing amount of water must be pumped in the near future.

THE SUSQUEHANNA RIVER AS A SOURCE OF WATER SUPPLY.

The Susquehanna river would appear to be quite as unobjectionable a source of supply as other rivers of its size and with proper care to prevent pollution it may fairly be regarded as an exceptionally good supply. Chemical analysis has shown that the water is of fair purity. The nearest village up the river is Great Bend in Pennsylvania, thirteen and one-half miles from Binghamton, and containing about 550 inhabitants. There are no considerable towns draining into the river for at least sixty miles above Binghamton.

Only a short distance above the pumping-works there are sources of contamination, however, which can be done away with at little trouble and at moderate expense. The chief of these pollutions is the cause of the present complaint.

CONTAMINATION FROM THE SEWAGE OF THE BINGHAMTON ASYLUM FOR THE CHRONIC INSANE.

The insane asylum is supplied with water from the Susquehanna river by means of a pumping engine situated on the banks of the river. A liberal amount of water is used at the asylum, amounting to about 60,000 gallons daily on the average. There are at present between 600 and 700 inmates in the asylum beside the officers. It is regarded probable that the number of inmates and officers may be increased to 1,200 or 1,500 in the future.

The sewage from the asylum is carried by drain pipes to a point 500 or 600 feet from the main building and forty or fifty feet below it, where it is discharged into two filtering tanks placed upon the brink of a ravine.

These filters are used alternately so that one may be cleaned out while the other is in operation.

The filters are constructed by first excavating a circular pit about fifty feet in diameter and six feet in depth. A wall of stone and cement masonry, two feet in thickness, is built as a lining to the pit; within this retaining wall and at a distance of five feet from it, a brick wall about one foot thick is built, the bricks being rather loosely laid. The annular space between the two walls is nearly filled with wood charcoal, and this is loaded with stones to keep it in place. The sewage is poured into the inner tank at the top, and the liquids filter through the brick wall and the charcoal till they are finally discharged at the bottom of the pit. The filtered sewage, which is still somewhat turbid, flows down a small ravine or gulley for about a third of a mile, till it is discharged into the river about a quarter of a mile above the in-take of the asylum pumping-works, and about 1⅞ miles above the Binghamton water-works.

It is evident that the filtration merely removes the coarse particles held in suspension in the sewage, for the effluent water causes a slimy deposit on objects over which it flows. It is not reasonable to suppose that the charcoal can operate to purify the sewage, by oxidizing its organic matters, for more than a few days at the longest before its pores become clogged. The charcoal is renewed only once in six months, and indeed it would be a very difficult and expensive undertaking to renew it much oftener. The purification of sewage by mechanical filtration has been tried at many places but never with very great success; better methods for the purpose have been devised and are much to be preferred.

There is certainly no question that the asylum sewage as now discharged into the river is a source of contamination of a most disgusting nature; moreover its discharge immediately above the point at which water is taken for the inmates of the iustitution makes the evil peculiarly revolting.

REMEDIES.

There are three remedies, either of which would decidedly improve the present condition of affairs.

First.—Sewage Irrigation.

Instead of discharging the effluent from the filters into the ravine, it might be allowed to flow on suitably prepared land where it could be utilized as a manure. Unfortunately the soil in the neighborhood

of the asylum is poorly adapted for treating the sewage in this manner; a very compact hard-pan underlies the surface soil at the depth of less than two feet, and extensive underdraining would be required. The present filters are too far below the necessary level to allow the effluent to reach the prepared land by gravitation, and they would have to be abandoned or pumping resorted to.

If the sewage was taken to a distance from the asylum where suitable soil could be found for irrigation, the expense of the necessary pipes, together with the fact that the irrigated land would not be under the control of the authorities at the asylum, would have to be considered as objections to this plan. If it were not for the fact that other and less troublesome methods of disposal can be secured at moderate expense, the method of irrigation would, however, deserve careful attention.

Second. Chemical Treatment.

The sewage could be treated with chemicals and the effluent discharged as at present. The purification of sewage has been so little tried in this country, that the expense for chemicals would necessarily be large until these should be produced in the crude state in greater quantities and at lower prices.

The recent investigations of Mr. Samuel M. Gray, C. E., of Providence, R. I., have furnished information regarding the amount of chemicals used, and the expense at several cities in England; from his statistics the facts in relation to these points have been derived. The process of chemical treatment, known as the "Coventry process," where alum, copperas and lime are employed, is one of the best as regards purity of effluent. This process is used in Coventry with 45,000 inhabitants, Hertford with 8,000, and Leyton with about 35,000. The daily amount of sewage treated at these places is 2,250,000 gallons, 2,000,000 gallons, and 1,000,000 gallons, respectively. With such wide differences in the dilution of the sewage, it is evident that the amount of chemicals, and the cost of the same, should be considered on the basis of the number of the population, and not that of the amount of sewage treated; this procedure is justifiable, since the entire amount of sewage produced is treated at each place.

The following table shows the amount of chemicals used and their cost at each of the cities named for one week and for 1, 000 inhabitants.

	Crude Alum.		Copperas.		Lime.		Total Cost
	Lbs.	Cost.	Lbs.	Cost.	Lbs.	Cost.	
Coventry....	249	$1 62	30	$0 11	174	$0 24	$1 97
Hertford....	182	1 36	140	30	70	9	1 75
Leyton......	192	1 12	32	21	176	35	1 68

About 400 pounds per day of partially dried sludge, containing about one-half its weight of water, is obtained from the sewage of 1,000 persons.

The copperas and alum are together dissolved in a small quantity of sewage-water, and then mixed with the sewage, after which the lime, separately slaked and mixed with sewage-water, is added and stirred in. After the precipitation has been effected, which requires about one hour, the water is drawn off and the semi-liquid sludge, which is nearly inodorous, is either dried up by pressure or by the evaporation of its water in the open air.

It should be said that the effluent water is still somewhat objectionable; the report on the treatment of the London sewage, which was tried experimentally on a large scale last summer, states that: "No system of single precipitation is capable of the production of an effluent free from sewage odor, even when the precipitants are used in excessive quantities. In order to obtain an inodorous effluent it would be necessary to employ a system of precipitation supplemented by treatment with a deodorizing agent, by filtration through well-burnt and carbonized clay, or by irrigation over an extended area."

The chief item of expense for chemicals in the cities referred to was that for alum; by omitting this, as was done in the London experiments, the expense for chemicals was only about one-quarter as great as when it was used. The sludge obtained where alum is not employed is more fluid than if it were used, but this would not be a very great objection where a small quantity only was to be dealt with.

Expense of Chemical Treatment.

To treat the sewage of 1,000 inmates of the asylum it would be advisable to construct two tanks, each about 170 feet by twenty feet, and

four feet in depth. Each tank could hold the entire amount of sewage discharged in one day; with well-built sides of masonry they would cost about $450 each.

If copperas and lime only were used, about 100 pounds of the former and 350 pounds of the latter would be needed each week, costing eighty cents and $1.40 respectively, at the present rates in this country, or $114.40 per year. The effluent would be improved by further treatment with some deodorizer, such as the permanganate of sodium or potassium, but these are at present much too expensive chemicals to employ for this purpose; their cost here is about $40 per 100 pounds, although permanganate of sodium cost in London, when manufactured for the purpose of sewage purification, only $3.80 per 100 pounds. The present filters might be employed with advantage for purifying the effluent to a certain extent by charcoal filtration.

One man employed one-half the time would be sufficient to mix the chemicals and remove the sludge. Capitalizing the various items of expense, the approximate cost of chemical treatment would be —

Two tanks of 100,000 gallons capacity each...........	$900 00
Chemicals at $114.40 per year, capitalized at three and a half per cent..................................	3,270 00
One-half of one man's labor, at $360 per year, capitalized at three and a half per cent.........................	5,142 00
Total capital..................................	$9,312 00

To offset this expense a manure would be obtained that should be somewhat better in quality and greater in quantity than that obtained from the present filters.

The process of chemical treatment has been so little developed in this country that the cost must be somewhat excessive at first. At the asylum the present filters demand a considerable amount of care, which would cost but little more if chemicals were used. An inferior quality of lime might be procured that would reduce the cost for that item. It would be a fairer estimate, therefore, to place the cost of chemicals and labor required in addition to that now employed as equivalent to a capital of $5,250, making the entire cost, with the precipitation tanks, $6,150. The annual outlay for chemicals and labor is here assumed to be $183.75.

It would be advisable to exclude storm-water from the sewage, to avoid unnecessary dilution if chemical treatment were to be attempted.

Since it is not known that the specific causes of disease that can be attributed to contaminated drinking-water are destroyed by chemical treatment as ordinarily employed, and since the water supply of the asylum is so near its sewage outfall, the purification of the sewage by the methods described can be regarded only as an expedient to be preferred to that now employed, and of moderate cost.

Third. Outfall Sewer.

The most certain and the most desirable method of preventing the contamination of the Susquehanna river at the places from which it is taken at Binghamton and at the asylum would be to discharge the asylum sewage below the dam that has been placed across the river at Binghamton. It might be urged that the river would be just as badly polluted as ever below Binghamton, but there are so many causes of pollution below the city that it can no longer be regarded as a suitable water supply beyond the Chenango river junction. Oswego draws its water supply from other sources, while adding its share of defilement to the river. Binghamton itself has recently adopted plans for a complete sewerage system, devised by Mr. Hering. The separate system is to be used, and construction will progress as rapidly as funds can be raised. There is no reason, therefore, why the asylum sewage should not be discharged into the river below the water-works, and since the current is much retarded by the dam, the sewage should be taken at least as far down the river as that point. The city sewers are to discharge at the junction of the Susquehanna and Chenango rivers, and the city authorities may deem it advisable to so alter their plans as to receive the asylum sewage into their pipes when they are laid. It would certainly be a great and much desired relief to the residents of Binghamton if the sewage could be discharged at the dam, and the question of taking it further down the river could be considered in future, without altering any plans that may now be made for discharging it at the dam.

Cost of Outfall Sewer.

A very close estimate of the cost of the necessary outfall sewer, with man-holes, etc., cannot be made without careful surveys. The

superintendent of the asylum, Dr. T. S. Armstrong, has obtained an approximate estimate of the necessary quantities.

About 14,100 feet of sewer-pipe are required, 4,300 feet of which would have a considerable grade, and would require a pipe no larger than eight inches in diameter. The remaining 9,800 feet of pipe would be laid on a light grade, estimated at five feet to the mile; a nine-inch pipe would be amply large, if this grade can be secured, to discharge from two to three times the amount of sewage produced by 1,000 persons.

It is the intention of the authorities at the asylum to filter the sewage, as at present, so as to obtain as much fertilizing material as possible for use on the asylum farm, hence the liquid to be carried by the sewer will be entirely free from any substances that could cause stoppage in the pipes.

Regarding the quantities furnished by Dr. Armstrong as sufficiently close for a preliminary estimate, and making a liberal allowance for contingencies, in view of the imperfect knowledge of the necessary data, the following estimate of cost is arrived at:

Quantities.	Description.	Price.	Amount.
12,795	Cubic yards excavation	25c.	$3,198 75
4,300	Lineal feet, 8 inches vitrified pipe laid	20c.	860 00
9,800	Lineal feet, 9 inches vitrified pipe laid	4c.	2,352 00
300	Cubic yards, retaining and slope walls	$1 50	450 00
20	Man-holes	50 00	1,000 00
20	Lamp-holes	15 00	300 00
			$8,160 75
Add 25 per cent for contingencies and engineering			2,040 19
Total			$10,200 94

With favorable contracts the pipe may even cost less than the above figures, while in view of the fact that the excavation will probably be of an easy nature, the estimate for that item would seem an ample one.

It would seem, considering all the circumstances, that the outfall sewer is to be preferred to any other method of disposal of the asylum sewage. By no other plan can the sewage be removed with as little trouble, and the cost will be small when the number of persons benefited is considered.

OTHER SOURCES OF CONTAMINATION.

It is stated that the sewage from the Susquehanna Valley Orphans' Home, which is not a State institution, still finds its way into the river above the in-take of the Binghamton water-works, and that the conditions fully described by Emil Kuichling, C. E., in his report to the State Board of Health, embodied in their third annual report to the Legislature, pages 248–250, still exist and have not been modified for the better. It furthermore appears that it is quite easy for the city authorities to compel this institution to adopt some mode of sewage disposal that will meet the sanitary requirements of the case.

The city water supply of Binghamton will certainly not be above reproach until the pollution from the Valley Home is stopped. Since the sewage from the Home is small in amount, and there is abundance of land available, it may be found that the entire amount may readily be utilized for irrigation purposes. To discharge the sewage below the dam, a pipe sewer of moderate length only would be required.

Very respectfully,

HORACE ANDREWS, JR., *C. E.*

ALBANY, *March* 26, 1885.

PROPOSED PLAN FOR REMOVING THE SEWAGE OF THE BINGHAMTON INSANE ASYLUM.

The attached plan and specifications for constructing a sewer of iron and vitrified pipe from the Binghamton Insane Asylum to the Court street sewer, in Binghamton is hereby recommended for the approval of the State Board of Health.

JAMES T. GARDINER,
Consulting Engineer.

To the Committee on Drainage, Sewerage and Topography, of the State Board of Health:

GENTLEMEN — I have been authorized by the trustees of the Asylum for the Chronic Insane, at Binghamton, to prepare plans for an outfall sewer from the asylum, and to submit the same with drawings and profiles to you for approval; in accordance with section 4 of chapter 399 of the Laws of New York, of 1885. After a careful examination of the ground and of the existing conditions, with due consideration of future possibilities, I have prepared the plan first mentioned below, but at the request of the trustees, the changes or modifications of the plan afterward referred to, are given also, in order that the committee may give their decision as to which plan for sewage disposal shall be definitely adopted.

PROPOSED PLAN.

It is the declared intention of the trustees to continue the use of filters or screens for removing the coarser solids from the sewage, and it is desirable that this should be done, both on account of the manurial value of such screenings and in order that large solid bodies may be kept out of the pipes.

From the present filters it is proposed to lay an eight-inch vitrified pipe through the asylum grounds for a distance of 2,596 feet; the pipe is to be laid in six straight lengths with man-holes at the bends. On two of the straight lengths a change of grade is made, to avoid deep cutting, and lamp holes are to be placed at these vertical bends. There is no grade in the eight-inch pipe of less than eight in 1,000, at which grade the pipe when running *half full*, would discharge about 38 cubic feet per minute, or over 400,000 gallons per day.

The amount of sewage now produced at the asylum can be closely estimated, since the water is approximately gauged as it is pumped from the river; it is doubtful whether it ever exceeds or equals 100,000 gallons per day, but ample provision has been made for 300,000 to 400,000 gallons in the plan proposed.

Rain-water from the roofs, when not used for laundry or other purposes, should not be allowed to needlessly increase the volume of sewage, and in the new buildings now being erected provision should be made to exclude rain-water from the sewers.

The eight-inch pipe terminates at a point on the south side of the asylum carriage drive, where a man-hole is to be placed; from this man-hole a six-inch cast-iron pipe, calked, and jointed with lead, conveys the sewage along the south side of the carriage drive to Court street, thence along the south side of Court street to the railroad crossing, from which point the sewer must be laid nearly in the center of the street, to avoid the water pipes, for a total distance of 8,622 feet.

The lowest point in the iron pipe is reached in front of the pumping works of Binghamton, where it is only three feet above the river and eighty-eight and one-half feet below the point at which it commences in the asylum grounds. From this low point the pipe rises, as it proceeds westward along Court street, about twenty-five and one-half feet, and terminates at a point on Court street a short distance west of Liberty street. The western extremity of the iron pipe will be 63.05 feet below its eastern end.

The six-inch pipe, when running full, is capable of discharging under the head mentioned, 36.87 cubic feet per minute, or 398,000 gallons per day; it is evident, therefore, that its capacity will be ample under maximum conditions. When only a small amount of sewage is being discharged the velocity of flow in the lower parts of the pipe will be very small, amounting to only twenty-five and one-half feet per minute for a discharge of five cubic feet per minute. Since the pipe is in the condition of an ordinary water-main this low velocity can occasion no stoppage, however, for the moment that

solids are precipitated the head of water will be augmented and the velocity of flow will be sufficiently increased to cause the deposited solids to be again put in motion. No better self-cleansing sewer could be devised in fact, for before an entire stoppage can occur in the lower portions of the pipe a water pressure of over 700 pounds will be brought to bear upon the obstruction. As a complete protection against the entrance of improper matters into the iron pipe it is proposed to commence the latter with a diameter of one foot, a suitable screen being placed over the end; the pipe will be diminished to its normal size of six inches, by reducers, within a few feet of its starting point.

ARRANGEMENT FOR FLUSHING.

It is designed that a suitable gate or pen-stock shall be placed at a point about 800 feet from the east end of the iron pipe; by closing this until the sewage is set back in the man-hole a flush of over 1,200 gallons could be secured. By opening the gate the stored up sewgae would run through the pipes with sufficient velocity to remove all sedimentary matters.

It is not supposed that the pen-stock will need to be used very often but it is proposed as an additional and inexpensive safeguard.

The sewage can undergo no putrefactive change within the iron pipe, since it is evident that the time required to renew its entire contents will be but a few hours. About 7,500 feet of the pipe, holding 1,473 cubic feet, or 11,045 gallons, will remain constantly filled and a flow of sewage, amounting to 2,500 gallons per hour, will cause the entire contents to be renewed once in four hours and twenty-five minutes. At times the flow of sewage may be somewhat smaller than here assumed, but such times of minimum flow will be of short duration. The filtering and screening of the sewage will be effectual safeguards against the accumulation of putrescent solids within the iron pipe, though it is not evident that such solids would do much harm within a water-tight pipe.

From the terminus of the iron pipe a ten-inch vitrified pipe of a length of 700 feet will be laid in a straight line and with a uniform grade of 3 in 1,000 to the head of Rutherford street, where the city sewer in Court street begins. The city sewer is, at first, a fifteen-inch vitrified pipe and at its dead end, where it is proposed to discharge the asylum sewage, there is no adequate provision for flushing. The dilute and filtered sewage from the asylum will tend to improve the condition of the city sewer materially.

The Court street sewer ultimately discharges into the Susquehanna river at the foot of State street, after receiving the contents of various branches, carrying the waste water of a large number of inhabitants.

The ten-inch pipe sewer, with a grade of 3 in 1,000, will discharge over 40 cubic feet per minute when running *half full*, or 432,000 gallons per day.

The advantages of the above plan are:

1st. An outlet is obtained that is as good as that of the city sewers.

2d. The sewage is raised to a sufficient height to admit of its being taken into the city sewers, whatever changes may be made in the plan of the latter.

3d. The use of iron pipe, carrying the sewage under pressure, obviates the necessity of very deep cuttings and of many man-holes; it also enables the sewage to be lifted up into the city sewers, whereas if it should be led along the river bank to a point below the Rock Bottom dam, it could not be taken into the city sewers without pumping, if at any future time the outlet below the dam should prove objectionable. By the use of iron pipe discharging into the Court street sewer, a saving of about 2,400 feet in length is effected, as compared with the route along the river bank.

4th. It is estimated, as shown below, that the entire work, including the iron pipe, can be completed within the appropriation, the greater cost of iron pipe being offset by the saving in distance and by the absence of man-holes and small depth of cutting along its course.

5th. The capacity can at any time be increased by extending its upper end. An increase in length of 600 feet would add over 20 feet to the head. It is not probable that such increase will ever be necessary.

6th. The sewer would be laid entirely in the streets and in State property.

APPROXIMATE MAXIMUM AND MINIMUM ESTIMATES OF COST OF SEWER LAID UNDER THE ABOVE-MENTIONED PLAN.

Quantities.	Description.	Maximum cost.		Minimum cost.	
2,596 ft.	8-inch vitrified pipe, laid..........	at $0 80	$2,076 80	at $0 50	$1,298 00
8,622 ft	6-inch iron pipe, laid	at 1 00	8,622 00	at 75	6,466 50
700 ft.	10-inch vitrified pipe, laid..........	at 85	595 00	at 45	315 00
9	Man-holes, complete	at 50 00	450 00	at 30 00	270 00
2	Lamp-holes, complete....	at 6 00	12 00	3 00	6 00
			$11,755 80		$8,855 50

APPROXIMATE MAXIMUM AND MINIMUM ESTIMATES OF COST OF SEWER TO NEW BUILDINGS.

Quantities.	Description.	Maximum cost.		Minimum cost.	
922.2 ft.	8-inch vitrified pipe, laid...	at $0 80	$737 76	at $0 50	$461 10
2	Man-holes.....	at 50 00	100 00	at 30 00	60 00
1	Lamp-hole................	at 6 00	6 00	at 3 00	3 00
			$843 76		$524 10

Total maximum cost	$12,599 56
Total minimum cost	8,879 60
Probable cost, average of above	10,739 58

The cost of the gate or pen-stock in iron pipe is not included It would be about $40.

MODIFICATIONS OF PLAN.

If all that is desired is to secure an outlet for the asylum sewage below the city pumping-works, vitrified pipes could be laid for the entire distance from the asylum to Brandywine creek, a few hundred feet west of the water inlet, and there an outlet could be secured by laying iron pipe out to the center of the river. Only very low gradients could be secured for the pipe from the asylum grounds to Brandywine creek; a uniform slope of 2 in 1,000 could be obtained without cuttings of over twelve feet in depth. A ten or twelve-inch pipe laid at this inclination would be barely self-cleansing, when running half full, while smaller sizes running full would not have sufficient velocity of discharge to prevent the precipitation of solids. It would be necessary to store up the sewage and let it flow down only at intervals, since its volume is not sufficient to fill a ten-inch pipe to a depth at which the flow will have velocity enough to keep the sewer clean, or to use an iron pipe and take advantage of the hydraulic head for the removal of obstructions.

The plan originally contemplated for securing an outlet below the Rock Bottom dam is a practicable one, but there are serious difficulties, both from the fact that private property must be invaded, and because the engineering difficulties are considerable. From Brandywine creek westward the sewer would be laid along the abruptly sloping river bank, and unless the river could be temporarily lowered behind the dam, the trenches would need to be below the level of the water in the river for a distance of from 2,000 to 3,000 feet. The outlet that could be secured below the dam would be no better than that of the city sewers at the foot of Carroll street, and the latter has been declared objectionable, and has been the occasion of legal controversies.

Very respectfully yours,

HORACE ANDREWS, JR., *C. E.*

ALBANY, N. Y., *July* 21, 1885.

CONTRACT AND SPECIFICATION FOR THE CONSTRUCTION OF SEWERS AND APPURTENANCES FROM THE ASYLUM FOR THE CHRONIC INSANE AT BINGHAMTON, N. Y., TO A POINT BELOW THE WATER-WORKS OF THE CITY.

This agreement made and concluded this day of , in the year one thousand eight hundred and eighty-five, by and between the *Trustees of the Binghamton Asylum for the Chronic Insane*, of the first part, and contractor , of the second part:

(A.) *Witnesseth*, That the said part of the second part ha agreed, and by these presents do agree with the said parties of the first part, for the consideration hereinafter mentioned and contained, and under the penalty expressed in a bond bearing even date with these presents and hereto annexed, to furnish at own proper cost and expense, all the necessary materials and labor, and to excavate for, and build in a good, firm, and substantial manner a sewer from the sewage filters at the Binghamton Insane Asylum to a point of discharge below the water-works of the city of Binghamton, and also, if the Trustees of the Binghamton Asylum for the Chronic Insane so direct, from the sewage filters to the new buildings now in process of erection; together with appurtenances of every kind complete, of the dimensions, in the manner, and under the conditions hereinafter specified, and ha further agreed that the said trustees shall be, and are hereby authorized to appoint their engineer and such other person or persons as they may deem proper, to inspect the materials to be furnished, and the work to be done under this agreement, and to see that the same correspond with the specification hereinafter set forth, to-wit:

(B.) SPECIFICATION.

Location (1). The sewers shall be located on the lines, shown in the plans of the work, which are approved by the State Board of Health of New York and will be staked out by the engineer.

Excavation (2). The ground shall be excavated in open trenches one foot wider on each side than the exterior diameter of the sewer, and to the necessary depth.

Shoring (3). The contractor shall furnish and put in place suitable sheet-planking and bracing wherever necessary to support the sides of the excavation.

The sheeting and bracing shall be removed as the work progresses in such manner as to prevent the caving in of the sides of the excavation; all vacancies left by the plank while being drawn shall be carefully filled, as may be directed by the engineer. The engineer may order the sheeting and bracing left in, when in his opinion it is necessary for the protection of the work, and such lumber shall be paid for as provided in article (E) of this agreement.

Drainage (4). The contractor shall, at his own expense, keep the excavation free of water while the foundations, masonry, or pipe are being laid, and shall do all the pumping, bailing, forming of dams or other works necessary.

In effecting the drainage, the water shall not be allowed to flow over the invert of the sewer, except under special conditions for protecting the work, approved by the engineer.

Back-filling (5). The work shall be back filled carefully, and packed and rammed under and around the sewer with proper tools. In refilling all the trenches, the earth shall be faithfully rammed in layers not exceeding nine inches in thickness, with rammers, weighing not less than twenty-five (25) pounds, and an area on the bottom of not exceeding sixteen (16) square inches.

Whenever any back filling is being done, there shall always be at least one man ramming, and the proportion of the number of men back filling to the number of men ramming shall never exceed three to one.

The hardening on the surface of the streets shall be carefully preserved, and replaced over the refilled trenches.

Repaving and restoring streets (6). When the pavement or surface of any street has been removed it must be replaced by the contractor and left in as good condition as it was before being removed.

All surplus material and rubbish must be removed by the contractor.

Protection against accidents (7). The contractor shall erect suitable barriers around all excavations to prevent accidents to passengers on the streets, and shall place and maintain during the night, sufficient lights on or near the work.

Cement (8). The cement shall be pure, fresh-ground, Rosendale cement, of best quality, and when used for filling the joints of the vitrified pipe sewers, only enough water shall be added to give it the proper consistence, and it shall be used as soon as mixed.

Cement mortar (9). The cement mortar to be used in building the man-holes, and for any other necessary masonry, shall be mixed in the proportion of one part, by measure, of cement to two parts, by measure, of clean, sharp sand, free from loam. The cement and sand shall be carefully mixed dry; the water afterward added, and the mortar made fresh for the work in hand. No mortar shall be used which shall be found to be weak or imperfect, either from standing too long after being mixed, or from any other cause.

Concrete (10). Concrete, when required, shall be composed of one part of cement mortar, made as before described, and two and one-half parts of clean gravel, or broken stone free from dirt, and of not more than two and one-half inches in diameter. It shall be quickly and thoroughly mixed, and immediately deposited in place, after which there shall be no walking or working over it, before it is set.

Brick masonry (11). The brick masonry shall be constructed of the best quality bricks, burned hard entirely through, regular and uniform in shape and size, and laid in cement mortar of the quality before specified.

Every brick shall be immersed in water immediately before being laid and shall have full cement joints under bottom, sides and ends, which for each brick shall be formed at one operation, and in no case shall be made by working in the mortar after the brick is laid. Every course of brick shall be laid with joints, not exceeding one-quarter of an inch for face work.

Man-holes (12). Man-holes shall be constructed of such size and at such places as the engineer may direct. They shall be of eight-inch brick work, worked up to within inches of the surface where the opening shall be two feet diameter in the clear.

Projections of iron, fifteen inches apart, to serve as steps, shall be built in the sides of the man-hole, as shown on the plans, or as directed by the engineer. The exterior surface of all man-holes shall be neatly plastered with cement mortar of the quality above described.

Vitrified pipes (13). The pipes for the eight-inch and ten-inch sewers shall be of vitrified sewer pipe, of a quality equal to the best pipe manufactured at Akron, Summit county, Ohio. They shall have socket joints and shall be homogeneous in texture, and burned hard entirely through. The area shall not be less than that of a circle of the specified diameter, and the variation in diameter shall not exceed one-half an inch. No pipe shall be used except for curves, which vary from a straight cylinder more than three-eighths of an inch in two feet.

Especial care must be taken to lay the pipe to the exact grade and line, by such means as the engineer may direct.

All pipes previous to being lowered into the trench shall be fitted together and matched, so that when jointed in the trench they may form a true and smooth line of pipes. In fitting the pipes together no means must be resorted to which shall, in the judgment of the engineer, be thought detrimental to the pipes.

Joints (14). A gasket of tarred oakum shall be pressed into the joint around the entire circumference of the vitrified pipe, to prevent the entrance of cement to the inside of the pipe. No joint shall be cemented until the gasket of the next joint in advance has been completed. Cement shall be pressed into the space between the socket and spigot so as to entirely fill the space, and the bevel joint at the end of the socket shall be smoothly and evenly made.

All iron pipe shall be jointed with lead, to a depth of not less than two inches, and such joints shall be thoroughly water-tight and completed to the satisfaction of the engineer.

An excavation must be made in the bottom of the trench for the sockets of the pipes so that these may be supported throughout their entire length.

Iron pipes (15). Iron pipes shall be cast vertically, the castings shall be truly cylindrical and the spigot of every socket pipe shall fit properly into the socket. The sectional area of every pipe shall be truly concentric, and any pipe which deviates more than one-fourth from the specified thickness must be rejected. The pipes must be furnished in twelve-feet lengths and must be seven-sixteenths of an inch in thickness. The tensile strength of the iron of which the pipes are formed shall not be less than 15,000 pounds to the square inch, and they shall be tested in a hydraulic machine to a pressure equivalent to a head of water of 400 feet.

Support for pipes crossing Brandywine creek (16). The cast-iron pipes crossing Brandywine creek above the bed of the creek shall be suitably supported by timbers and so boxed around and protected as to be secure from danger of freezing and of damage from ice during freshets.

The timbering and securing from frost shall be done in a durable and substantial manner and shall be subject to the approval of the engineer.

Protection of joints from the roots of trees (16½). Wherever the vitrified pipes pass in the neighborhood of trees the joints shall be prepared with especial care and they shall also be surrounded with concrete, wherever in the opinion of the engineer it may seem advisable, so as to effectually protect the pipes from the insinuation of roots.

Sewers and man-holes to be kept clean (17). When the trench is left for the night, or the pipe laying is stopped by rain storms or any other cause, the ends of the pipe must be closed water-tight with a plug and cement or in such other manner as the engineer may direct. Before the sewers and man-holes are accepted all earth and rubbish must be thoroughly removed from them.

Dismissal of incompetent persons (17½). If any person employed on the works by the contractor shall appear to the engineer to be incompetent or disorderly, he shall be discharged immediately on the requisition of the trustees; and such person shall not again be employed.

House connections (18). Y branches shall be placed at points indicated by the engineer. They shall be closed with an earthenware cap, and the space above the cap shall be filled with sand, covered with a thin coating of cement.

Valves (18½). Valves in the iron pipe shall be of good workmanship and accurately fitted in all their parts; they shall be suitably protected from frost, and so arranged as to be readily operated from the surface of the ground, in the usual manner of arranging such appurtenances to water pipes.

Suspension of masonry and protection from frost (19). No work in cement masonry shall be done when the thermometer is below 35° F. All unfinished masonry shall be properly protected from frost and water.

Responsibility of contractor (20). The contractor shall have charge of and be responsible for the entire line of works until their completion and acceptance, and any unfaithful or imperfect work that may be discovered at any time before the final completion and acceptance of the work embraced in this agreement shall be corrected immediately on the requirment of the engineer.

Rejected materials to be removed (21). All materials to be provided by the contractor shall be of the best description, and he shall furnish all efficient labor and implements necessary for the full and complete performance of his contract. If any materials or implements should be brought to the ground, which the engineer may deem to be of improper description, or improper to be used in the work, the same shall be removed by the contractor as soon as practicable.

Work to be prosecuted without unnecessary delay (22). If at any time the work is stopped by the insufficiency of pipe or other materials on hand, the contractor must be liable for all expenditures

that the trustees incur by such delay, including the pay of the engineer.

Lamp-holes (23). Lamp-holes shall be constructed by placing a six-inch "T" branch vertically in the sewer and bringing it up to within one foot of the surface by adding pipes of the same diameter. The tops of the lamp-holes shall be closed with covers of vitrified earthenware, and earth to the depth of one foot shall be placed over the covers.

Line and level marks to be protected (24). The contractor shall furnish the engineer the necessary facilities for giving lines and grades for the work, and shall carefully protect such line and level marks from being disturbed.

Power to vary work (25). The work shall be carried on in such portions as the engineer shall direct, and he shall have the power also, with the consent of the trustees, to vary, extend or diminish the quantity of work during its progress without vitiating the contract; but no parts of the works shall be altered by the contractor from that shown on the drawings or described in the specification, without the express sanction of the engineer in writing.

Disputes (26). In case of any dispute as to the meaning of this specification, the decision of the engineer given in writing shall be final and conclusive.

Omissions (27). Any work not herein specified, which may be fairly implied as included in this contract, of which the engineer shall judge, shall be done by the contractor without extra charge.

Trustees (28). Wherever the word "trustees" is used in this specification it refers to the trustees of the Binghamton Asylum for the Chronic Insane, the parties of the first part to this agreement.

Engineer (29). Wherever the word "engineer" is used in this specification it refers to the engineer appointed by the trustees to plan and direct this work, or his authorized assistant or inspector, and all explanations or directions necessary to completing satisfactorily the different descriptions of work contemplated and provided for under the contract will be given by said engineer.

Contractor (30). Wherever the word "contractor" is used in this specification, it refers to the party or parties of the second part to the agreement for the construction of the work herein specified.

Interpretation of terms (31). Bids shall state the price per lineal foot of pipes of each size and material laid as herein specified, which price shall be in full for all labor and materials required for the complete execution of the work; also the price for each man-hole and lamp-hole complete.

Time (C). The said part of the second part hereby further agree that will commence the aforesaid work within five days after notice in writing shall be given to commence, and progress therewith so as to complete the same, in accordance with this agreement, on or before the expiration of the day after the date of said notice.

Work to be done (D). The approximate estimate of the work to be done, upon which the award to the contractor will be made, is as follows:

Seven hundred feet of ten-inch vitrified pipe sewer, to be laid along Court street, from Rutherford street eastward, with Y branches for house connections, requiring a trench of from six to eight feet in depth.

Eight thousand six hundred and twenty-two feet of six-inch cast-iron pipe sewer, to be laid from the terminus of the above-mentioned ten-inch pipe, eastward along Court street to the asylum grounds and in the private road of the asylum, requiring a trench of six feet in depth, also a proper support for the pipes in crossing Brandywine creek, under the bridge and to be carried under the two dry gulleys near the asylum grounds. One penstock or valve to be placed in the iron pipe.

Two thousand five hundred and ninety-six feet of eight-inch vitrified pipe to be laid through the asylum grounds to the east of the carriage drive and requiring a trench of from six to nine feet in depth, averaging about seven and one-half feet in depth. Nine man-holes, two lamp-holes.

Also if the trustees shall so decide, 922 feet of eight-inch vitrified pipe, to be laid through the asylum grounds to the new buildings, requiring a trench of from six to nine feet in depth, averaging about seven and one-half feet in depth. Two man-holes, one lamp-hole.

Prices (E). The said part of the second part hereby agree to receive the following prices as full compensation for furnishing all materials and labor in building and constructing, and in all respects completing the aforesaid work and appurtenances, in the manner and under the conditions before specified, to-wit: For furnishing the material and building the iron and vitrified pipe sewers, man-holes, and lamp-holes; also all the excavations, whether hardpan, quicksand, slides, boulders or otherwise; also all plank used for sheet piling, or any timber used for supporting the banks or sides of the excavation; also all bailing and pumping; also the repairs to the gas-pipes and water-pipes; also the filling in and ramming the earth around and over the sewers and appurtenances; the removal and disposal of all rubbish or surplus earth, dug out of the trenches; also for furnishing earth and sand for refilling the trench, in case of deficiency; also the cleaning out of the sewers and man-holes, and the removal of all rubbish immediately after the completion of each section, as hereinbefore provided; also for suitable timbering to support the iron pipe over Brandywine creek, and to protect it from ice and frost; and for well and faithfully completing the same, and the whole thereof in the manner hereinbefore specified, viz.:

For sheeting and bracing, ordered left in, the sum of ten dollars ($10) for each 1,000 feet, board measure.

For each running foot through the center, of all ten-inch vitrified pipe sewer the sum of .... $
Of all eight-inch vitrified pipe sewer the sum of....
Of all six-inch cast-iron pipe sewer the sum of......
For each man-hole complete the sum of............

For each lamp-hole complete the sum of........... $
For pen-stock in iron pipe... ....
For each Y branch in the ten-inch pipe.............
For each Y branch in the eight-inch pipe..........

Contract not to be assigned without permission (F). An said part of the second part further agree that wi assign, transfer or sublet the aforesaid work, or any part tl without the written consent of the trustees, and that any assign transfer, or subletting, without the written consent of said tr shall in every case be absolutely void.

Provisions for payment (G). And the said part of the s part further agree that shall not be entitled to dem receive payment for any portion of the aforesaid work or ma until the same shall be fully completed, in the manner set fo this agreement, and such completion certified by the engin charge of the work, and by the inspector appointed to exami same, and until each and every of the stipulations herein mentioned are complied with. Whereupon the parties of th part will pay, and hereby bind themselves and their success pay, to the said part of the second part in cash, on the of the month next succeeding that in which the work is done, e five (85) per cent of the monthly estimate of the whole amo money accruing to the said part of the second part unde contract: Providing that nothing herein contained be con to affect the right hereby reserved of said trustees to reje whole or any portion of the aforesaid work, should the said certi be found or known to be inconsistent with the terms of this agre or otherwise improperly given.

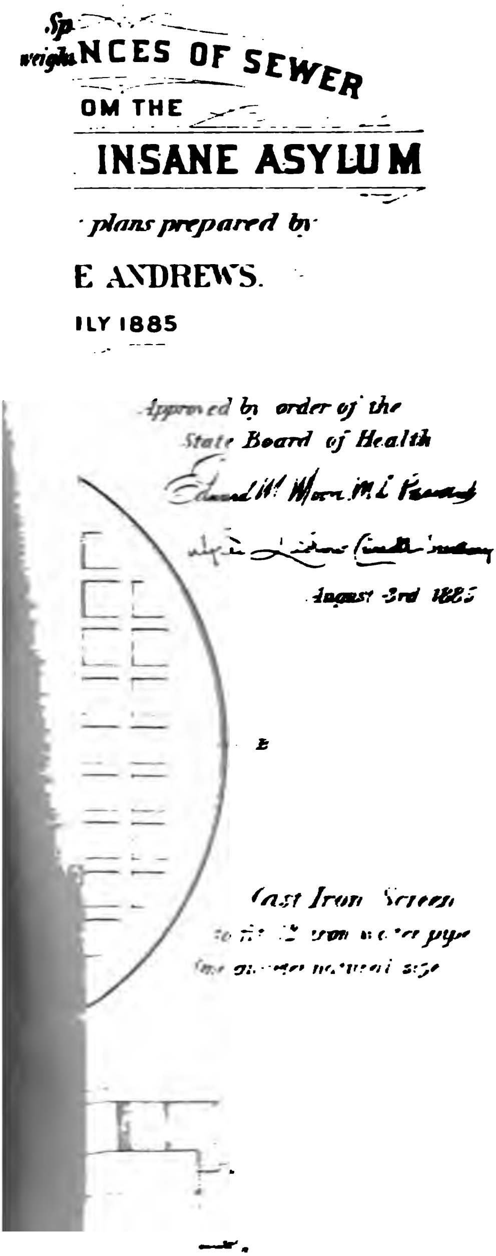
When the percentages retained are to be paid (H). An further agreed by the parties of the first part, that the rem fifteen (15) per cent shall be paid to the said part of the s part as follows: Ten (10) per cent when the contract is pleted and duly certified to, and the remaining five (5) pe at the expiration of six months from the date of the final es for the whole work.

IN WITNESS WHEREOF, The parties to these presents have unto set their hands and seals the day and year first above wri

The above-named plan is hereby approved by order of the Board of Health.

EDWARD M. MOORE, M. D.,
Presid
ALFRED L. CARROLL, M. D.,
Secret

[The outfall sewer from the Asylum for the Chronic Insa Binghamton, with branches to the new buildings, was const



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substantially in accordance with the plans, as approved by the State Board of Health. The sewerage system has been in successful operation since December last.

Mr. Horace Andrews was the engineer appointed by the trustees of the asylum to prepare the plans and to supervise the work during construction. His assistant, Mr. John L. FitzGerald, personally inspected the entire work of construction in all its details. The contractor was Mr. Arthur Osborn, of Binghamton.]

REPORT UPON THE OAK HILL CEMETERY AT NYACK, ROCKLAND CO.

ALBANY, *November* 25, 1885.

To the Board of Health of Nyack:

GENTLEMEN — I have the honor to transmit herewith the report of Mr. Andrews on the condition and probable sanitary effects of the cemetery adjoining your village, a report with which I fully concur. The dangers arising from the decomposition of animal matter in burying-grounds vary with the character of the soil, but under any circumstances, the difference is rather one of degree than of kind. In porous soils, such decomposition takes place most rapidly, complete decay of the body sometimes occurring in a very few years; but these soils permit the greatest diffusion of gaseous and dissolved products. In the case under consideration, with a gravelly superficies underlaid by almost impervious strata, such wide diffusion of the rapidly-produced liquified results of putrefaction would be particularly favored, and the risk of pollution of comparatively distant sources of water supply enhanced. It has long been a matter of common experience that low fevers and various forms of "filth diseases" are apt to prevail in the neighborhood of old burying-grounds where population gathers around them; and even before these marked consequences ensue, a general depreciation of vitality and a lessened power of resisting other causes of disease is often observed.

As regards the report of Dr. Hailes, it may be remarked that although our present knowledge of the roles played by different species of bacteria is not sufficiently accurate to justify a positive statement as to the precise "diseased germs" contained in any given specimen of water, but by common consent among biologists the rapid multiplication and early liquefaction of the solidified gelatin is considered as indicating approximately the disease-producing nature of the microscopic organisms under investigation. The warning given by Mr. Andrews in relation to the ice-pond is one that should be heeded; the popular superstition that water in freezing purifies itself from organic matter is mistaken, and it is certain that a temperature far below freezing does not destroy the germs of the most virulent maladies.

I am, gentlemen, your obedient servant,

ALFRED L. CARROLL, M. D.,
Secretary.

Engineer's Report.

To the Secretary of the State Board of Health:

SIR — In accordance with your instructions, and in response to a request from the board of health of Nyack, dated October 10, 1885, I have made an examination of the Oak Hill Cemetery and its surroundings, and herewith submit my report:

SITUATION OF OAK HILL CEMETERY.

The cemetery, known as Oak Hill Cemetery, is situated partly within and partly without the corporation limits of the village of Nyack, in the extreme western part of the village, and distant about three-fourths of a mile from its central or business portion.

The land upon which the cemetery is situated slopes abruptly to the south, and more gently to the east and south-east. A small creek, flowing eastward past the cemetery and through the village, has been dammed to form an ice-pond, covering several acres and lying to the south of the sloping ground upon which the cemetery is placed. A considerable number of interments have been made within 500 feet of the shore of the ice-pond and at elevations between 60 feet and 150 feet above the level of its surface.

There are six or eight dwelling-houses between the cemetery and the ice-pond, and a number to the eastward of the cemetery. The Rockland College, a large boarding-school, also is located very near to the cemetery, and to the eastward of the same.

All of the houses mentioned, including the school, are supplied with water from wells and springs adjoining them. Many of the houses have been built for a number of years, and have till recently depended exclusively upon their wells for drinking water. The superintendent of the cemetery resides within its limits, on the southerly slope, and has for many years been supplied with water from a spring upon the property.

A number of the houses referred to, as well as the school, are now provided with water pumped from the Hackensack river, several miles to the westward, but the disagreeable and turbid appearance of this water renders its use for drinking purposes a rarity, while some of the houses have no other supply than their wells. Suitable filtering would probably render the Hackensack river water unobjectionable.

NUMBER OF INTERMENTS AND CHARACTER OF THE SOIL.

The first burial in the cemetery was in 1848. On March 1 1865, the cemetery was incorporated, and it has shown a stea growth for a number of years, about 150 interments being ma yearly at the present time. Allowing for the number of remov there are now about 4,000 bodies interred within the cemetery, shown by the books of the company.

The act of 1865, incorporating the cemetery, fixes its size as ... exceed fifty acres in addition to the area occupied at the tir

the passage of the act. The entire area at present is estimated at thirty acres, while the interments are confined to an area of about eighteen acres.

The cemetery has recently been increased in size by an extension of nine or ten acres to the eastward of the old inclosure. The land annexed lies to the north of the Rockland College property, which is also bounded on the west by the cemetery.

There are at present no interments in the eastern annex referred to, and this land has not been improved to any great extent.

Upon the southerly slope of the cemetery the soil is composed of gravel, underlaid with hardpan, at a depth of five or six feet, and with trap-rock, which latter crops out on the surface in one or two places. In the newly-annexed portion, the land slopes more gradually, and is of a more moist and springy character than in the old portion.

Interments are usually made at a depth of five feet. In the deeper gravel near the southern limit of the cemetery, bodies seem to be entirely decomposed and to disappear after fourteen or fifteen years. The graves are well drained in all parts of the cemetery now occupied. To provide effectual drainage in the new part a small pond is to be excavated in the lower portion, the surplus water from which will be removed by drains or by evaporation.

UNSANITARY CONDITIONS.

At the present day there is, on the part of sanitary authorities, no doubt regarding the injurious effect of cemeteries upon the public health.

The pollution of water is a great and manifest evil. In the case of Oak Hill Cemetery there is good reason to believe that the water in the various wells in its vicinity has been brought into contact with the bodies of the dead, and holds organic impurities in solution. The water may not be rendered at all turbid by such organic matters and they may not affect its taste, unless present in large quantities, but chemical or biological analysis will generally reveal the truth regarding the suspected contamination.

Three samples of water accompany this report; they are all of apparent purity, but from the nature of the surroundings of the wells which furnished the water, there is great reason to apprehend that it is in every case impregnated with the liquids and soluble matters of decomposition.

Sample No. 1 is from the well of the Rockland College. This well is thirty-seven feet in depth. From its location it may be contaminated both with cemetery and privy drainage.

Sample No. 2 is from a spring of remarkable clearness about seventy feet from the north shore of the ice-pond. The surface of the water in the spring is three feet above that in the pond, and the water is three feet deep in the spring.

Sample No. 3 is from a well in the south-western part of the cemetery inclosure.

A large part of the cemetery drainage must find its way into the ice-pond. The use of ice from the pond should certainly be confined to the refrigerating operations of brewers, or to other uses where it may be kept from actual consumption by human beings.

In Paris, a law forbids the sinking of a well within 300 feet of a cemetery; in some parts of Germany the same distance is fixed as the minimum allowable, while cases are known to exist where 200 yards has proved an insufficient distance to guard against contamination.

Under ordinary circumstances water contaminated with decaying substances will merely have the effect of lowering the vital powers and of increasing susceptibility to disease, but water contaminated with drainage from the bodies of the dead may be loaded with specific poisons and with the germs of disease. Instances are recorded where the use of such water has occasioned frightful epidemics.

The gaseous products of decomposition may readily be drawn into houses adjoining a cemetery, especially during the winter when the ground is frozen on the surface. The artificial heat within dwelling-houses then tends to create a suction and in-draught of air from the sub-soil. The soil of a graveyard has been known to be so completely filled with carbonic acid and other gaseous products of decay that the heavier gases accumulated in newly-made graves with such rapidity as to endanger the lives of those employed to dig them.

The fœtid air exhaled from graves, even when dissipated by the wind, may lower the vital powers of those daily exposed to its influence.

It is, therefore, strongly to be desired that the mouldering remains of the dead should be removed as far as possible from dwelling-houses. The congress of hygiene at Brussels recommended that an interval of at least a quarter of a mile should separate a cemetery from any habitation.

The further extension of Oak Hill Cemetery must be deplored on sanitary grounds; it is now much too close to many dwelling-houses for the safety of their occupants, while the continual addition to the number of those buried within its limits gives assurance that the water and the air are daily receiving new burdens of decay.

The interests of health demand that cemeteries shall be placed at remote distances from dwellings and that their use be promptly discontinued whenever it is discovered that the abodes of the living are crowding upon those of the dead.

The forces of nature will at length cleanse the soil of graveyards and the atmosphere around them, if the decomposing matter is not continually replenished. It is wise to look to the future, anticipating the growth of villages and cities by gradually discontinuing the use of cemeteries near their limits. The growth of vegetation in such abandoned burial places will eventually purify them so that, maintained as public parks, they may become conducive to health and beneficial to adjoining property.

Very respectfully yours,

HORACE ANDREWS,

ALBANY, *November* 2, 1885. *Civil Engineer.*

Water Analysis.

ALBANY, *November* 11, 1885.

A. L. CARROLL :

'EAR SIR — Upon biological analysis of specimens of water sent ne from Nyack, N. Y., Nov. 1, 1885, collected by H. An- vs, I report as follows:

LOCALITY	Date of culture.	Time of first appearance of micro-organisms.	Time of beginning of liquefaction of gelatine.	Extent of liquefaction of gelatine in five days.	Observations.	Parts of chlorine in 100,000.
1. Well water, ›kland Seminary..	Nov. 2..	36 hours..	3d day..	Entirely destroyed	The colonies of bacteria were very numerous; developed rapidly and liquefied the gelatine very quickly and consumed the whole mass..............	1
2. Spring water, ar ice pond........	Nov. 2..	36 hours..	3d day..	Entirely destroyed	The colonies of bacteria were very numerous; developed rapidly, and liquefied the gelatine very quickly and consumed the whole mass..............	1.10
3. Well water, ar barn, Oak Hill metery	Nov. 2..	36 hours..	3d day..	Entirely destroyed	The colonies of bacteria were very numerous; developed rapidly, and liquefied the gelatine very quickly and consumed the whole mass	1.15

POTABLE WATER SUPPLY.

he following law was passed by the Legislature in the interest nany localities suffering from the pollution of the sources from ch they derived their potable water supplies, by parties living ›nd the jurisdiction of the localities affected:

AN ACT to confer upon the State Board of Health power to protect from contamination, by suitable regulations, the water supplies of the State and their sources. Passed June 13, 1885; chapter 543, Laws of 1885.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The State Board of Health is hereby authorized and empowered to make rules and regulations for protecting from contamination any and all public supplies of potable waters and their sources within this State. Provided, however, any such rule or regulation shall not be operative in any county until the county judge of that county shall approve the same.

§ 2. The said State Board of Health shall also have power, and it shall be its duty: 1. To publish once a week, for at least six consecutive weeks, all such rules and regulations as it shall have made concerning the contamination of any sub-soil waters, springs, streams, lakes, ponds, reservoirs, or other bodies of water contributing to the potable water supply of any municipality within this State, such publication to be made in one or more newspapers published in the county in which the waters affected by such regulations are located. The cost of publishing the regulations of the State Board of Health, as above provided, shall be paid by the corporation or municipality benefited by the protection of the water supply, concerning which the rules are made. 2. To impose penalties for the violation of, or the non-compliance with, their rules and regulations, not exceeding two hundred dollars in any one case.

§ 3. The officer or board having by law the management and control of the potable water supply of any municipality, in all cases where the said municipality derives its water supply in whole or in part from any sub-soil water springs, streams, lakes, ponds, reservoirs, or other waters concerning which the State Board of Health shall make any rule or regulation, is hereby authorized and empowered to make such inspection of the sources of said water supply as said officer or board may deem advisable to secure the said water supply from any defilement, and to ascertain whether or not the rules and regulations made by the State Board of Health are complied with.

§ 4. In case such inspection shall disclose the violation by any person or persons of any of the rules or regulations of the said State Board of Health relating to the sources of said water supply, the officer or board mentioned in section three of this act shall serve or cause to be served a copy of the said rules and regulations, accompanied by a notice specifying the rule or regulation claimed to have been violated, upon the said person or persons violating such rules or regulations. If the person or persons so served do not immediately comply with the said regulation, the said officer or board having charge of the water supply of the municipality affected thereby shall notify the State Board of Health of the violation of its rules;

the State Board of Health shall thereupon examine into the said violation, and if the party complained of is found to have actually violated any of the said regulations, the Secretary of the State Board of Health shall order the local board of health having jurisdiction thereof to convene and enforce obedience to the said regulation.

§ 5. In case any local board of health having jurisdiction thereof fails to enforce the order of the Secretary of the State Board of Health within ten days after the receipt of a notification so to do, as provided in the last section, the corporation furnishing the water supply, or the municipality deriving its water supply from the waters for the sanitary protection of which such rules have been made, is hereby authorized and empowered to maintain an action in a court of record and which shall be tried in the county in which the cause of action arose against the person or persons violating the said rules for recovery of the penalty therein provided.

§ 6. Every person who shall willfully violate or refuse to obey any rule or regulation made and published by the State Board of Health, and approved pursuant to the provisions of this act, shall be guilty of a misdemeanor, and on a conviction thereof shall be subject to a fine or imprisonment, or both, at the discretion of the court, such fine not to exceed three hundred dollars, nor such imprisonment six months. But the recovery of a penalty in a civil action, as provided in section five of this act, and criminal prosecution and conviction under the provisions of this section, shall not be had for the same offense.

§ 7. When the State Board of Health shall, for the protection of a water supply from contamination, make regulations, the execution of which will require the providing of some public means of removal or purification of sewage, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, construct and maintain such works or means for sewage disposal, as shall be approved by the State Board of Health.

§ 8. The State Board of Health, any local board of health, or any municipality or corporation furnishing water, may cause the affidavit of the printer, publisher, or proprietor of any newspaper publishing the rules and regulations as provided by the second section of this act, to be filed with such rules as published in the clerk's office of the county in which the municipality or corporation furnishing the water supply in any case may be situated or located, and such affidavit and rules, or duly certified copies thereof, shall be deemed conclusive evidence of due publication and of all the facts therein stated in all courts and in all proceedings or prosecutions under the provisions of this act.

§ 9. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

§ 10. This act shall take effect immediately.

Under the above act, rules and regulations have been made as hereinafter specified:

RULES AND REGULATIONS FOR THE SANITARY PROTECTION OF TH WATERS OF HEMLOCK LAKE, THE PUBLIC POTABLE WATER SUPPL OF THE CITY OF ROCHESTER.

Privies adjacent to the Lake.

RULE I.

Section A. All houses, cottages, tenements, tents, camp an pic-nic grounds, adjacent to the shores of Hemlock lake, shall b provided with, at least, one privy, which shall be placed upon th ground, without any vault beneath it, and shall be so constructe that metallic pails, fifteen inches high by fourteen inches in diamete can be placed under the seats and be frequently and easily remove with their contents.

Section B. The privies shall be so located that access to then from the lake may be had, for the purpose of facilitating the re moval of the pails.

Section C. Occupants of the premises should daily add earth o ashes to the contents of the pails, as a deodorizer and absorbent.

Section D. The owners and occupants shall also exercise du care and oversight of the pails used in the privies.

Section E. When any privy is to be used in winter as well a summer it shall be so located and arranged that the pail may b replaced by a water-tight box or trough resting on solid runners o small wheels, and having a staple by which it may be drawn out from under the seat, or be otherwise so arranged that when the bo is sufficiently filled, it may be taken from under the privy and th contents emptied in some safe place, where they cannot possibly b washed into the lake or into any stream running into the lake, o into any well or spring. Ashes should daily be thrown into th privy box as a deodorizer.

Section F. No owner or occupant shall have upon their premise any privy vault of any kind situated within two hundred feet o the shore of Hemlock lake.

RULE II.

Section A. The city of Rochester shall furnish a sufficient num ber of pails, for the use of each privy situated within two hundre feet of the shore of Hemlock lake, and shall cause the pails to b placed under the seats, and to be removed, emptied, cleansed an disinfected as often as may be necessary to insure that they are kep in good sanitary condition.

Section B. When a full pail is removed from a privy, its plac shall be immediately supplied by an empty one.

Section C. The pails shall be made of metal, and shall be fifteel inches high by fourteen inches in diameter, outside measurement They shall be provided with covers, to be used during removal.

Section D. The removal of the pails from the privies shall be con ducted in such a manner as to cause as little inconvenience or annoy ance to the occupants of the premises as is compatible with prope management of the business.

Section E. The contents of the pails shall be removed by the city of Rochester to some point below the foot of the lake, and be so treated and disposed of as to cause no nuisance nor danger to the public health.

Privies near Streams, Springs or Water-courses on Hemlock Lake Water-shed.

RULE III.

Section A. No privy shall be located within thirty feet of any stream, spring or dry water-course, the water from which, when running, empties eventually into Hemlock lake.

RULE IV.

Section A. Any privy situated within fifty feet of any stream, spring or dry water-course, on the water-shed of Hemlock lake, or within fifty feet of the bank of any ravine on this water-shed shall be constructed without a vault, and shall have under the seats half barrels, tubs, pails, or water-tight boxes or troughs arranged to be easily and frequently removed, emptied, cleansed and returned to their place, under the privy seats. Ashes or dry earth should daily be used in these privies as a deodorizer and absorbent.

RULE V.

Section A. The owners or occupants of premises having privies with tubs, pails or boxes, shall cause the contents to be removed and the receptacle to be cleaned as often as is necessary to keep the privy in good sanitary condition.

Section B. The contents of the said privies shall be disposed of in such a manner that they can by no possibility be washed into any stream, dry water-course, ravine, spring or well, either over the surface or through the sub-soil, and the excremental matter shall be so placed as not to cause an offensive nuisance.

RULE VI.

Section A. If, owing to the porous character of the soil, the height and flow of the surface or sub-soil waters, the steepness of the slopes, or other conditions of the locality, it shall be the judgment of the local board of health, or of the State Board, that the excremental matter from any privy may be washed on the surface or through the soil into some neighboring spring or water-course, then, after due notice to the owners or occupants of these premises, their privy shall be made to conform to the rules governing privies, situated within fifty feet of water-courses.

Garbage.

RULE VII.

Section A. The owners or occupants of all houses, cottages, tenements, tents, camp and pic-nic grounds, within two hundred feet of

Hemlock lake, shall place all garbage produced on their premises in such receptacles as may be provided therefor by the city of Rochester.

Section B. No garbage shall be thrown into the lake, or upon the ground within two hundred feet of the lake, nor shall it be thrown upon any spot where it may possibly be washed into the lake.

RULE VIII.

Section A. The city of Rochester shall provide proper receptacles for receiving the garbage produced on all premises within two hundred feet of Hemlock lake, and shall cause the same to be removed and emptied as often as may be necessary.

RULE IX.

Section A. All house slops, and sink and laundry water, produced on premises adjacent to Hemlock lake, shall be thrown upon the surface of the ground, and distributed so as to prevent concentration and saturation at one spot, but no such polluted water shall be thrown upon the ground within one hundred feet of the lake shore, or as near that limit as the depth of the lot will permit, nor into, nor near any spring, water-course or ravine.

RULE X.

No garbage or house slops, sink or laundry water shall be discharged into any stream, spring or dry water-course, on any part of the water-shed of Hemlock lake, nor shall any such putrescible or polluted waters be thrown upon the ground or into it, where they may pollute any spring, stream or water-course on this water-shed.

Animal Manures

RULE XI.

Section A. All stables situated within two hundred feet of Hemlock lake shall be provided by their owners or occupants with a tight and well-covered bin or box, in which all manure shall be placed, and from which it shall be removed as often as cleanliness may require.

RULE XII.

Section A. No stable, pig-sty, hen-house, barn-yard, hog-yard, hitching or standing place for horses, or other place where animal manure accumulates, shall be so constructed or located that the manure from it may wash into the lake or into any stream, spring or dry water-course running into the lake.

Manufacturing Waste.

RULE XIII.

Section A. No waste products, putrescible matters or polluted waters from any slaughter-houses, cheese factories, wine or beer

'aults, cider-mills, tanneries, saw-mills or other manufactories shall be allowed to drain or wash into any stream, spring or dry water-course, or any part of Hemlock lake water-shed, or into the lake.

Animal and Vegetable Matters.

RULE XIV.

Section A. No dead animal, bird or fish, nor any filthy or impure matter, nor any decayed fruit, vegetable substances, leaves, saw-dust, roots, branches or trunks of trees in any condition of their growth or decay shall be thrown into Hemlock lake, or so placed by any person that they shall wash into the lake, nor shall they be thrown into any spring, stream or water-course running into the lake.

Washing Sheep or Animals.

RULE XV.

Section A. No sheep or other animals shall be washed in Hemlock lake, or in any influent stream within half a mile of the lake, nor shall any diseased sheep be washed in any spring, pond or stream on the water-shed of Hemlock lake.

RULE XVI.

Section A. In accordance with chapter 543 of the Laws of 1885, a penalty of $50 is hereby imposed upon any person or persons guilty of violation of or non compliance with any of the above given mandatory rules or regulations, to be recovered under said act.

Approved by order of the State Board of Health.

EDWARD M. MOORE, M. D.,
President,

ALFRED L. CARROLL, M. D.,
Secretary.

ALBANY, *July* 23, 1885.

Approved *August* 3, 1885.

FRANK RICE,
Ontario County Judge.

RULES AND REGULATIONS FOR THE SANITARY PROTECTION OF THE WATERS OF THE WEST BRANCH OF CANADAWAY CREEK, THE PUBLIC POTABLE WATER SUPPLY OF THE VILLAGE OF FREDONIA, N. Y.

Privies near Streams, Springs or Water-courses.

RULE I.

No privy shall be located within thirty feet of any stream, spring or dry water-course, the water from which, when running, empties eventually into the west branch of Canadaway creek above the reservoir of the Fredonia water-works.

RULE II.

Any privy situated within fifty feet of any stream, spring or dry water-course, on the water-shed of the west branch of Canadaway creek above the reservoir, or within fifty feet of the bank of any ravine on this water-shed, shall be constructed without a vault and shall have under the seats half barrels, tubs, pails, or water-tight boxes or troughs arranged to be easily and frequently removed, emptied, cleaned and returned to their place, under the privy seats. Ashes or dry earth should daily be used in these privies as a deodorizer and absorbent.

RULE III.

Section A. The owners or occupants of premises having privies with tubs, pails or boxes shall cause the contents to be removed and the receptacle to be cleansed as often as is necessary to keep the privy in a good sanitary condition.

Section B. The contents of the said privies shall be disposed of in such a manner that they can, by no possibility, be washed into any stream, dry water-course, ravine, spring or well, either over the surface or through the sub-soil, and the excremental matter shall be so placed as not to cause an offensive nuisance.

RULE IV.

If, owing to the porous character of the soil, the height and flow of the surface or sub-soil waters, the steepness of the slopes, or other conditions of the locality, it shall be the judgment of the local board of health, or of the State Board, that the excremental matter from any privy may be washed on the surface or through the soil into some neighboring spring or water-course, then, after due notice to the owners or occupants of these premises, their privy shall be made to conform to the rules governing privies situated within fifty feet of water-courses.

Garbage and House Slops.

RULE V.

No garbage or house slops, sink or laundry water shall be thrown or discharged into any stream, spring or dry water-course on any part of the water-shed of the west branch of Canadaway creek above the reservoir, nor shall any such putrescible or polluted waters be thrown upon the ground or into it, where they may pollute any spring, stream or water-course on this water-shed.

Animal Manures.

RULE VI.

No stable, pig-sty, hen-house, barn-yard, hog-yard, hitching or standing place for horses, or other place where animal manure accumulates, shall be so constructed or located that the manure from it

may wash into the said creek or into any stream, spring or dry water-course, running into it above the reservoir.

Manufacturing Waste.

RULE VII.

No waste products, putrescible matter or polluted waters, from any slaughter-houses, cheese factories, wine or beer vaults, cider-mills, tanneries, saw-mills or other manufactories, shall be allowed to drain or wash into any stream, spring or dry water-course on any part of the water-shed of the said creek above the reservoir.

Animal and Vegetable Matters.

RULE VIII.

No dead animal, bird or fish, nor any filthy nor impure matter, nor any decayed fruit, vegetable substances, leaves, saw-dust, roots, branches or trunks of trees in any condition of their growth or decay, shall be thrown into the said creek or into the reservoir, or so placed by any person that they shall wash into the stream or reservoir nor shall they be thrown into any spring, stream or water-course running into the creek above the reservoir.

Washing Sheep or Animals.

RULE IX.

No sheep or other animals shall be washed in west Canadaway creek or in any branch thereof above the reservoir.

The Reservoir.

RULE X.

The authorities in charge of the water-works shall as far as practicable keep the reservoir free from accumulations of vegetable matter and shall prevent the accumulation of decaying vegetable matter and animal manure on the hill slopes from which such matter may be washed directly into the reservoir.

RULE XI.

Section A. In accordance with chapter 543 of the Laws of 1885 a penalty of $50 is hereby imposed upon any person or persons guilty of violation of, or non-compliance with, any of the above given mandatory rules or regulations; to be recovered under said act.

Approved by order of the State Board of Health.

EDWARD M. MOORE, M. D.,
President,

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT UPON THE SANITARY CONDITION OF THE TOWN OF H SON, WESTCHESTER COUNTY.

To the Chairman of the Committee on Sewerage, Drainag Topography of the New York State Board of Health:

SIR — I herewith submit the following report respecting the of complaint made by parties residing in the town of Hai Westchester county.

For the past few years the department of public works of th of New York has been negotiating for land and has consti the works necessary to supply the extreme northern part of sai with water. As a part of the plan adopted the two Rye pon lakes, forming a portion of the northern boundary of the tov Harrison, are to be used as a storage reservoir. The elevation surface of these lakes, which are said to be quite deep, is abou feet above mean tide. The department of public works had s laws passed to enable it to legally obtain control of the nec land and water rights; had a commissioner appointed to apprai value of such lands and paid all claims for land and damages l beginning the excavation of said works, so there can be no doul that the dealing of the city with the land-owners has been fai legal, and that all property taken has been well paid for.

The department of public works has constructed a dam of and masonry at the outlet of Little Rye lake to enable it to rais lower the water through a range of 16.6 feet, as allowed by law has purchased sufficient land around the lakes to allow of ra the water 3.5 feet higher. This dam was constructed last year, being continued until the latter part of December, when it was c owing to severe weather. It was the necessary changes of lev these lakes during the construction of this dam and the causew the foot of the larger lake that produced the malaria complain The larger lake was raised until the flat land at the east end ai one or more places on the south side were overflowed.

It was found necessary to draw the lake down in June, le the recently covered flats, which formerly had been covered with brush and grass, now dead or dying, owing to the action of v exposed to the hot sun for some time, when the lake was allow fill, only to be again drawn down in the hot weather of Septei As a result, the action of the sun on the decomposing vegetabl ter filled the air with malarial poison, and the people to the nu of one hundred or more, living on the east and south sides o lakes, who had previously experienced no such malady, were str with miasmal disease in the forms of ague, low fever and dysei

A dread of a recurrence this year of the causes leading to scourge led to the complaint made.

There are few residents north of the lakes within a mile, and are cut off by quite a high rocky ridge. The majority live to east and south of said lakes, many of those suffering from this s of malaria living over the line in the State of Connecticut, whi

inclosed sketch shows, lies near the east end of Big Rye lake. All families residing within a mile of these lakes on the east and south sides of the same were in part or wholly affected with malaria. These people are for the most part highly respectable, many of them Quakers, and nearly all owning valuable real estate. The average assessment value of the land in the town of Harrison, which contains no villages, is over $100 per acre, at least one-half of which is owing to the desirability of the locality for the residences of the people doing business in New York city. Should this source of malaria be maintained it will detract largely from the value of land for suburban residences. These lakes formerly were not only very attractive but desirable places of resort, and the experiences of last year detract very much from its reputation as a healthy locality.

The soil is a sandy loam, with frequent outcroppings of rocks. The topography surrounding the lake basins is such that the fluctuating surface of the lakes within the limit given above will have no appreciable effect on the sub-soil water of the region. As will be seen from the sketch the summit of the water-shed to the south is very near the lakes, which are largely maintained by springs, the main supply being from melting snow and rains. At present the lakes are not drawn from and the water is about 2.8 feet below the spillway in the dam, so it is very doubtful if the lakes will rise to the legally authorized level this season.

On the flats between the lakes and at the east end the water at present is about two or three feet deep, while the tops of old brush, weeds, etc., rise above the surface.

REMEDY SUGGESTED.

I was informed, although not officially, that it is proposed to clean these flats of the vegetation this season. In my judgment, the interest of the consumers of this water demands that these flats be denuded of all the old turf to a depth of a foot or more in some swampy places; that the brush and stumps be removed and the banks maintained in a good sanitary condition. This would, in my opinion, remove largely, if not altogether, the cause of this complaint.

If, besides this, the department of public works would delay drawing the water down in the reservoir until late in the season, say October 1st, the cooler weather of that season would render the effect of the exposed flats (shown on sketch in red tints) less deleterious to the public health.

Respectfully submitted,

April 16, 1885.

O. S. WILSON, *C. E.*

·REPORT OF COMMITTEE.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health Town of Harrison, Westchester Co., N. Y.:

GENTLEMEN — In response to your petition requesting the State Board of Health to examine the sanitary condition of the town as

affected by the alternate rising and lowering of the waters of Rye lake by the department of public works of the city of New York. Mr. O. S. Wilson was sent to make a careful inspection of the lake and its surroundings. A copy of his report is herewith transmitted. It appears that the city of New York have by direct legislative enactment procured the right to raise and lower the water at Rye lake through a range of 16.6 feet, and that in accordance with the act by which they have acquired this right a commission was appointed to determine the damage to the surrounding property from such action on the part of the city of New York; that the damages were determined by the commission and the full amounts paid. In the process of construction of the dam or dams at this lake last year the low lands, which were covered with a heavy growth of grass and vegetation, were twice covered with water, and twice the water was drawn down exposing these previously submerged lands with their decaying vegetation to the hot sun.

This was done once in June and once in September, and shortly after the exposure of these saturated lands to the action of the sun, it appears that two very serious outbreaks of malarial fever occurred. Such outbreaks of malaria have previously been unknown in this region according to the statements of the physicians of the town. It seems, therefore, more than probable that the fevers were due to the flooding of lands thickly covered with vegetation, causing the death of the plants which, on the drawing down of the water, decayed rapidly when exposed to the action of the sun.

Since the Legislature has given the city of New York by special statute the right to raise and lower this lake the State Board of Health has probably no power to prevent it. But the danger to health from this procedure can be very much lessened if the city of New York will thoroughly clean the vegetation and vegetable mould from the banks and bottom of the reservoir at least to low-water mark. This treatment of the pond bottom will not only be conducive to the health of the people, of the neighboring town, but will undoubtedly improve the quality of the water which is supplied to the city from Rye lake. It is not safe to allow this decomposing vegetable matter to remain in a reservoir, and our inspector was unofficially informed that the city intends to clean the reservoir as soon as practicable.

It is earnestly hoped that nothing will prevent the city authorities from carrying out this plan at an early day, since it is essential to the health of the people of the city of New York who drink the river water of Bronks and to that of the people who reside in the vicinity of the pond.

On behalf of the Board,

ERASTUS BROOKS,

Chairman Committee on Drainage, Sewerage and Topography.

REPORT ON THE POLLUTION OF THE WATER SUPPLY OF THE VILLAGE OF CORTLAND.

To the Committee on Drainage, Sewerage and Topography:

GENTLEMEN — In accordance with instructions from the committee I visited Cortland on the 17th of September, and having made arrangements with Mr. B. F. Taylor, president of the Cortland Water Company, I visited with him on the 18th, a large spring from which the village of Cortland derives its public water supply.

This spring is situated about a mile from the village. It is of remarkable size and volume. The spring or basin containing a number of springs is some four hundred and fifty feet long and from forty to sixty feet broad. The water is seen bubbling up from the bottom in many places and is also running in from under the banks.

A dam with waste-weir has been placed along the lower end of this spring or basin. The water is pumped from above the dam to the reservoir on a neighboring hill from which it runs into the village of Cortland.

At the time of my visit the pumps were not working, so that the total volume of water delivered by the springs was flowing over the waste-weir. The supply seemed ample for a population larger than that of Cortland, which is now over 7,000.

The water-works were built by an incorporated company called the Cortland Water-Works Company which furnishes water to the village under a contract made with the authorities. The greater part of the spring basin belongs to the water-works company, but a small portion of it is on the land of Mr. Fairchild. That part of the basin belonging to the water company has been thoroughly cleared out, leaving a perfectly clean bottom, and the sides have been walled in a very creditable manner.

A small part of the basin on the property of Mr. Fairchild contains a number of springs. This part of the basin is not clean or properly protected from pollution. The bottom and shores are partly covered with muck, decaying wood lies either in the waters or close to the water's edge, a part of the border is in a swampy condition, and animal manure is both in the water and immediately on the shore in considerable quantities. The lot on which this spring is situated is used as pasture for from ten to fourteen head of cattle. They come to this spring to drink, trample up the muck on the borders and the bottom of the spring, and their droppings often fall either into the water or on to the immediate shore, where they may readily pollute the spring.

It is at once evident to anybody visiting the spring that there is quite a large amount of animal and vegetable matter in the spring and on its borders, the decay of which pollutes the water to a greater or less extent.

The water of this part of the spring flows directly down the basin and in about three hundred feet enters the pipes of the water-works company. The perfect cleanliness of that part of the basin belong-

g to the water-works company makes the defilement of that rt on Mr. Fairchild's property most evident and disgusting. That e spring is polluted is apparent to the most casual observer. This ate of things is injuring the public health of Cortland in two vays: The pollution of the water with decaying wood and leaves, with muck into which cattle are constantly tramping with manure, and with manure and urine as well as with constantly decaying aquatic vegetation which is fostered by those conditions; such pollution, I repeat, undoubtedly contaminates the water and injures it, from a sanitary point of view, for public use in the village of Cortland. But conditions which are so repulsive to the senses and so evident to any one visiting the spot have such an effect on the minds of the people that hundreds are doubtless deterred from taking water from the public water supply and continue to drink well water, which is of very doubtful purity in the village of Cortland.

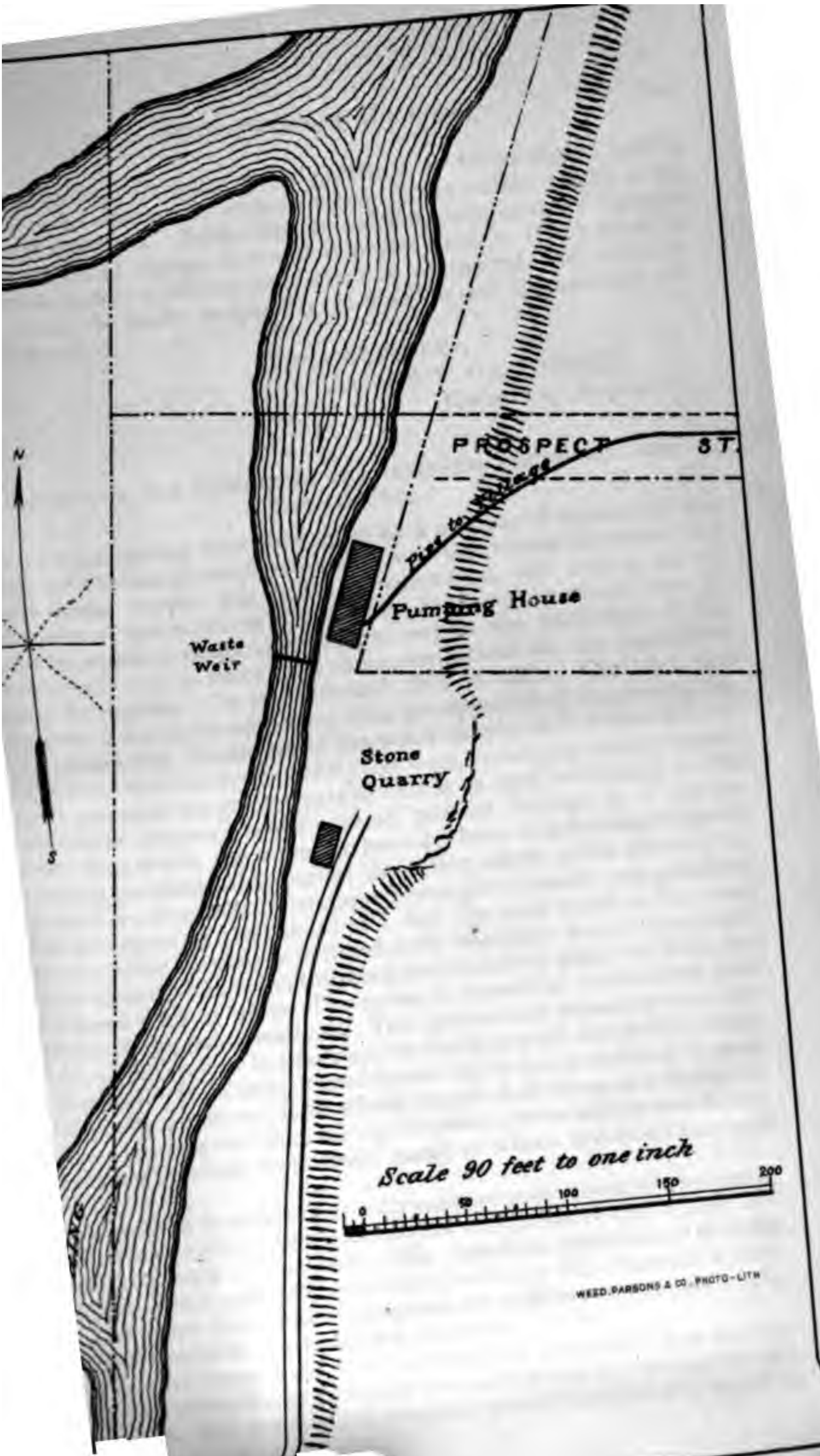
The pollution of the stream is thus acting as a source of injury to the health of the citizens of Cortland, by causing many of them to continue to drink from contaminated wells when if the springs were kept pure they would undoubtedly prefer the public water supply.

For these two reasons — first, because of the actual pollution of the water, and secondly, because many are influenced to continue to drink well water, by reason of the repulsive character of the pollution — the condition of the spring on the property of Mr. Fairchild is in my judgment a nuisance detrimental to the health and lives of the citizens of Cortland.

It does not appear to be in any way necessary for the enjoyment by Mr. Fairchild of the use of his pasture that this spring should be kept in its present foul condition. Four hundred feet from the spring above spoken of is another spring in the same pasture, at which cattle can easily drink; and the president of the water company informs me that the company have offered to put up a watering trough near the present spring to keep it perpetually supplied by a small pipe from the pumps of the water-works company. Such an arrangement was made with the owner of the other half of the spring, and I saw the watering trough which they had built and it seems to be answering every purpose for the watering of cattle in the adjoining pasture.

In order that the spring which supplies Cortland with water shall be kept in perfect sanitary condition it will doubtless be necessary that the water-works company should obtain the right to clean and protect from defilement the immediate banks of the spring from which decaying matter may be washed into the basin.

The public then can hold the water company responsible for maintaining the purity of the supply. The water-works company allege that they have endeavored to purchase this right or rather to purchase so much of the land about the spring as is necessary to secure this privilege, and that the owner refuses to make any reasonable terms for the land.



PROSPECT ST.
Pipe to Village
Pumping House
Waste Weir
Stone Quarry
N
S
Scale 90 feet to one inch
0
50
100
150
200
WEED, PARSONS & CO., PHOTO-LITH

The difference between these parties as to terms should not be allowed to be a source of serious injury to the public health of the village of Cortland. Rather than allow the continuance of the present condition of things it seems desirable that in the interest of the public health a judicial determination of the value of this property should be made as speedily as possible and the existing nuisance abated.

Very respectfully,

JAMES T. GARDINER,
Consulting Engineer.

REPORT OF THE COMMITTEE ON DRAINAGE, SEWERAGE AND TOPOGRAPHY.

A petition having been forwarded by a number of citizens of the village of Cortland, complaining that a spring which furnishes the public water supply was being contaminated, and asking for an abatement of the nuisance, Consulting Engineer Gardiner was directed to make an examination and to report the condition of the water supply and to make such recommendations as the conditione seemed to require. On the 17th and 18th he visited Cortland, and his report is herewith appended with the approval of the committee.

It appears that the source of the water supply of Cortland is from a basin some four hundred and fifty feet long, containing a large number of springs; that the greater part of this is on land belonging to the water-works company, while a small portion belongs to a private owner, with whom the company have not been able to come to terms as regards purchase; that part of the spring which is the property of the water-works company has been thoroughly cleaned and protected from defilement on the banks; and that the part which is the property of a private owner is polluted with decaying wood, muck and animal manure. It is the drinking and standing place for from ten to fourteen head of cattle. The spring is, therefore, defiled with both animal and vegetable matters. The evident and offensive character of this pollution acts in two ways to the injury of the public health of Cortland. It actually contaminates the water, and being a matter of public notoriety, it so affects the mind of the people that great numbers are deterred from taking the public water supply and forced to continue drinking from wells, many of which are doubtless polluted.

This state of things undoubtedly makes the condition of the spring on Mr. Fairchild's property a nuisance dangerous to the health and life of the people of Cortland. We, therefore, recommend that the condition of that part of the spring situated on Mr. Fairchild's property, the water from which flows into the public water supply of the village of Cortland, be declared a nuisance.

We further recommend that in order that the public may be able to hold the water-works company responsible for the purity of the supply, that the water-works company should acquire the right to

clean and protect from pollution the spring and its immediate banks, and that in case the parties in interest are not able to agree upon terms for the acquiring of this right, that in the interest of the public health a judicial determination of its value should be made as speedily as possible.

ERASTUS BROOKS,
Chairman, Committee.

At a meeting of the State Board of Health on September 24th, at Albany, the above report was presented, and, on motion, adopted by the Board, its recommendations approved and a copy ordered transmitted to the parties interested.

ALFRED L. CARROLL, M. D.,
Secretary.

REPORT

ON THE

PRACTICAL OPERATION OF THE SEPARATE SYSTEM OF SEWERS.

The experience of the committee on drainage, sewerage and topography of the State Board of Health, during the past two years, has shown that the great obstacle to the introduction of sewerage systems into the villages and smaller cities of the State is the anticipated cost. While there are localities in many of the villages which at certain seasons suffer from accumulations of storm-water upon the surface, the evils arising from this source are as nothing compared with those that are due to the accumulations of sewage, including excremental matter and slops in the privies, cess-pools and gutters about the dwellings.

The sanitary problem usually presented is, to provide some cheap and effective method of carrying away the sewage proper from the villages, and disposing of it in such a way as not to create a nuisance. In other words, the accumulation of filth in the ground and on the ground around the dwellings of people must, if possible, be prevented. In the experience of the State Board of Health, the cheapest effective way of accomplishing this purpose is usually by the separate system of sewerage combined with subsoil drains for drying the cellars and sub-soil.

While the separate system of sewerage has many advantages from the economical and sanitary standpoint, it is comparatively new, and it has been felt that its practical operation could not altogether be foreseen. Difficulties would probably arise in practice which would have to be overcome by new devices. That the Board might be thoroughly informed on the practical working of the separate system in places where it has been tried for several years, Horace Andrews, C. E., was sent to the city of Keene, New Hampshire, and to Staten Island, to examine into the operations of the system in the light of the experience at these places. His report is herewith appended, and it is believed that the facts therein given may be valuable, not only to this Board but to the local authorities who are considering the question of introducing the system of separate sewers.

In general, the result of Mr. Andrews' inquiries shows that the working of the separate system has been eminently satisfactory, and that no practical difficulties of any magnitude have arisen in the operation of these small sewers, either in Keene, on Staten Island or at Rockaway.

The city of Schenectady has been contemplating for several years the building of a system of sewers. Prof. Cady Staley, professor of civil engineering in the Union University, made a careful study of the working of the separate system in many places in this country, and as a result advised the city to adopt it. He was directed to make complete plans and specifications for a separate system of sewers in Schenectady, and the contract to build the sewers, according to these specifications, was let to Mr. B. Van Vranken, of Schenectady, in 1884.

We have appended to this report the specifications drawn by Prof. Staley, and also the bids of fifteen different contractors on these specifications. The specifications and bids are given for the information of the Board, and of localities and engineers specially interested.

REPORT ON THE PRACTICAL OPERATION OF THE SEPARATE SYSTEM OF SEWERAGE.

JAMES T. GARDINER, Esq., *Chairman of Committee on Drainage, Sewerage and Topography:*

SIR — In accordance with your instructions I have examined into the working of the separate system of sewerage at Keene, New Hampshire, and at New Brighton and Rockaway in this State. I have endeavored to ascertain not only the thoroughness with which the system of sewerage accomplishes its object, but also to discover whatever defects exist and the methods that have been proposed for their remedy.

I wish to acknowledge my indebtedness for information furnished me through the courtesy of the Hon. Horatio Kimball, mayor of Keene, and Mr. D. H. Sawyer, the superintendent of the sewerage at the same place, and also to Mr. C. T. Barrett of West New Brighton, Staten Island.

THE SEPARATE SYSTEM OF SEWERAGE.

The separate system of sewers is now generally understood to mean that system which has for its object the removal of all waste-water except that furnished by rain and melted snow. The system

may or may not carry the water draining from the sub-soil, but all storm-water is to be carefully excluded.

In the modern separate system as used in this country there are several essential features:

First. The pipes carrying sewage must be of small size, in order that a constant and rapid flow may exist in them and that accumulations of solid matter obstructing the sewers and generating gases may be prevented. It is also desirable to keep the pipes of small size in order that the water used in flushing them may thoroughly cleanse their entire inner surface.

Second. Automatic flushing-tanks are placed at the end of each line of pipe and are arranged to discharge a large quantity of water into the sewers at intervals so as to cleanse them thoroughly.

Third. Perfectly free access of air to the sewers is essential not only to ventilate them, but that the sudden rush of water from the flushing-tanks may not draw the water from traps in houses or force air through them.

There are various accessories to the system, but wherever the separate system is in use in this country the above requisites are regarded as essential.

The details relating to the separate system have already been fully described in the reports of the State Board of Health, and it will be only necessary to treat of them incidentally in referring to the practical working of the system.

SEWERAGE OF KEENE, NEW HAMPSHIRE.

This was planned as the result of a memorial, presented in June, 1882, to the city councils by the health commissioners of Keene, by Geo. E. Waring, C. E. The work was executed in 1882–3 by contract with the Drainage Construction Company under personal direction of John Bogart, C. E., of New York. The inspecting engineer employed by the city was L. M. Muzzey, C. E., of Boston. The system comprises the following lengths of pipe:

15 inch.	9,065 feet.	Contract price	$2 05	per foot.
12 "	3,441 "	"	1 61	"
10 "	1,178 "	"	1 34	"
8 "	2,742 "	"	1 06	"
6 "	44,806 "	"	90	"

Aggregate length, 61,232 feet.

The contract price given above includes all materials and expense of laying.

There are forty-four flushing-tanks holding from 140 to 150 gallons of water and capable of being discharged as often as once in six hours, if necessary. Each flush-tank completed cost $63; they were built with double walls having an air-space between to guard against freezing. Extra covers of wood have been provided within the iron covers as an additional protection against frost. Two inlets allow the water of Beaver brook to enter one of the fifteen-inch mains. These inlets were built at a cost of $100 each. There are two outlets, costing $200 each, and fifty-one man-holes, costing $40 each.

The full amount paid by the city for plans, construction, superintendence, land damages, fees, etc., was $79,688.85. The net deductions from the original contract price amounted to $8,414.30, certain streets where it seemed to the city authorities that no connections would be made for a number of years having been omitted from the general plan.

The surface formation in the city of Keene, embraced within the area covered by the sewerage is such as to naturally divide it into two distinct districts with separate outfalls for the sewers into the Ashuelot river. The Central district embraces the central and western portion of the city. The Beaver brook district embraces the eastern section.

The grade of the fifteen-inch main of the Central district averages one in 310, and the laterals have in general a grade of one in 250, though there are four or five short lines whose grade is about one in 400.

The main of the Beaver brook district has a grade of only one in 800, and for a few hundred feet from the outlet of only one in 1000 - the laterals of this line have good grades, not less than one in 400.

In the original plan only six man-holes were provided on each district, but, as already mentioned, fifty-one were built at frequent intervals on the mains and at junctions of pipes where they seemed desirable.

The kinds of pipe used were the Boynton, of New Jersey, the Akron, the Portland and English and Scotch pipes. The amount rejected was nearly the same of each kind used, the Portland seeming a trifle the best.

Hand-holes, with loose covers extending about fifteen inches over the top of the pipes, were placed at about every 100 feet on the six-inch sewers, and about every third one of these is replaced by a stand-pipe rising to within a short distance of the surface. By means of the stand-pipes the flow of water at different points can be

examined and the approximate position of any obstruction can be ascertained. Wherever curves were made in the pipes, hand-holes were placed at each end of the curve.

Carefully-selected cement was used in making the joints between sections of pipe, which were first calked with twisted oakum to prevent the entrance of the cement.

Sub-soil drainage is secured by means of drain-tiles, nearly round and non-porous, laid in two-feet lengths, the joints being wrapped about with two thicknesses of muslin. The tile-drains are laid alongside the sewer and at nearly the same grade; they enter the sewer-pipe, or a man-hole, about once in 300 feet.

During the construction of the sewer, Y branches for house connections were provided, and the fee of $5 is charged by the city for making such connection. Maps, carefully drawn on a large scale, enable the exact location of the stand-pipes, hand-holes and house connections to be readily ascertained. Distances from street corners and property lines to the stand-pipes, hand-holes, etc., are expressed in figures upon the maps. These maps are evidently quite essential adjuncts to the system of sewerage.

THE PRACTICAL WORKING OF THE SEPARATE SYSTEM AT KEENE.

The number of families to whom the sewers are now accessible is 720, besides seven manufactories and three hotels.

The entire population of Keene, according to the census of 1880, was 6,784.

Water-works were introduced at Keene in 1869, though the city was not incorporated until 1874.

The sewerage system is now in complete working order, it embraces every locality where it is called for and occupies some streets where it will be but little used for some time to come. The sewerage system was completed and accepted about September 1, 1883. On December 1st of the same year ninety-one permits to make house connections had been granted, and on January 1, 1885, the number had been increased to 213.

SEWER-PIPES.

The sewers are, in general, laid at the depth of six feet or more, not only to guard against frost, but to prevent them from interfering with the water-supply pipes, which are laid at a depth of five feet. No trouble has been occasioned by frost, and probably none would have occurred if the pipes had been somewhat nearer to the surface.

In Paris, where laid in earth, a depth of from two and one-quarter to four and one-quarter feet was thought sufficient to protect the sewers from frost.

Notwithstanding the great pains taken to prevent the intrusion of cement at the joints, in some places such partial obstructions were discovered while testing the pipes. No stoppage has been noticed from this cause, however, and in only one instance has there been any stoppage in the mains; this was in Dunbar street, and occurred from the lodgment of quicksand, supposed to have worked through faulty joints in the pipes. Two hand-holes were afterward added between Dunbar and Water streets to facilitate the removal of obstructions at any future time.

It has been noticed that when pipes are removed, which is sometimes the case in making house connections, they soon become very badly cracked and unserviceable. The cause of this cracking is not apparent, and the pipes do not seem defective as long as they remain in place and are not allowed to become dry. The defect mentioned is probably of little consequence at Keene, where frost cannot reach the pipes; but, as there is a considerable difference in the porosity of pipes and their impermeability is an important element in their durability, it would be well to carefully test them in this respect before accepting them. Some sewer-pipes will soak in as much as seven per cent of their weight of water, while others will absorb less than one-half of one per cent.

Roots of trees have been noticed in places inserting themselves into the joints, although they have occasioned no trouble at the present time. It would be desirable to take special precautions to prevent the intrusion of roots where the pipes are laid in the neighborhood of trees.

A very extensive growth of fungus has been observed in the sewer-pipes ever since they have been in operation, and it does not seem to be diminishing in amount. This fungus growth attaches itself to the sides of the pipe only, and it grows for the most part under the water, which flows rapidly through the pipes. In the man-holes, where the upper half of the pipe is removed, the fungus may easily be seen; it is quite soft and easily detached, and has not, thus far, been the cause of any obstruction in the pipes. Last spring the pipes were flushed with a large volume of water, by means of hose attached to the street hydrants, and the fungus was detached in great quantities. When the growth of fungus becomes of considerable bulk, it generally seems to be broken or dragged off by the rapid current

from the flushing-tanks, and it is, therefore, hardly probable that it will ever become a source of trouble.

The frequent emptying of the flush-tanks, together with the flow of water from houses and sub-soil drains, keeps a stream of water constantly running in the mains. In the twelve-inch pipe on Davis street the volume of water was sufficient to nearly half fill it.

OUTLETS.

At the time of my visit both of the outlets were nearly three feet below the service of the water in the Ashuelot river; they consist merely of fifteen-inch iron pipes projecting a few feet from the shore and slightly inclined down stream. The system of the Beaver brook district receives the drainage of a tannery, which imparts a reddish tint to the water; the discolored water could be plainly seen pouring from the outlet of this system, while at the outlet of the Central district, where the fall is much more considerable, floating matters could occasionally be seen issuing from the mouth of the sewer. It was, therefore, evident that the three-feet head of water did not occasion any difficulty in the discharge.

During high water last spring, when the water rose over eight feet above the outlets, there was still no difficulty experienced in the discharge, though it was thought, when the plans were first made, that jet-pumps, which were to have been worked from the city water supply, would be required at the outlets.

There is a slight bend in the river at the Central district outlet, and last spring the bank at the outlet was somewhat disturbed by the current, which also washed sand in front of the outlet-pipe, yet it was found that the flow of sewage was sufficiently strong to preserve a clear opening through the sand that was heaped up in front of the outlet.

MAN-HOLES.

The man-holes are covered with close covers of iron, so that their function is not that of ventilation. Up to the present time the man-holes have been of use chiefly as a convenient means of inspecting the flow in the pipes. The experience of a number of years will be needed before a correct opinion can be formed as to the exact number of man-holes that are really necessary. An expenditure of about $1,560 was required to provide the thirty-nine man-holes not included in the original plan. It might have been more economical to have dispensed with these extra man-holes, even if their absence

should render the removal of obstructions somewhat more difficult.

When high water occurs, the interior surfaces of some of the manholes in the lower part of the city become coated with filth, and it is necessary to give these a thorough cleaning when the water has permanently subsided.

FLUSHING-TANKS.

There are now forty-five flushing-tanks in use, one new one having been built in 1884, and one of the original tanks having been moved on account of the extension in Washington street.

Owing to precautions taken in building the tanks, and to the frequent disturbance of the water when they empty, there has been no trouble from freezing, even in the most severe weather.

Water is supplied to the tanks through a one-quarter-inch faucet, which is but partially opened. The tanks are filled in about eight hours, and their entire contents, about 150 gallons, are then discharged by a large bell siphon in about sixty seconds; this is equivalent to a discharge of two and one-half gallons per second.

If a six-inch branch pipe were perfectly clean and there were no house connections it would require nearly three gallons per second, to fill it entirely if it were laid with a grade of one in 300, or three and a quarter gallons per second, with a grade of one in 250. Since many of the laterals are laid with a steeper pitch than one in 250, it is probable that in some of these the flush does not entirely fill the pipe, still no trouble has yet been met with owing to insufficient flushing, and, except for the fungus growth, the pipes are kept in a clean condition and very little odor is perceptible in them.

The same difficulty in keeping the supply-cocks of the flushing tanks from being stopped by sediment has been met with at Keene, as at Memphis, Tenn., though to a less extent.

At Memphis it has been stated by Mr. Wm. H. Baldwin, who inspected the sewerage system in the spring of 1884, that the muddy character of the water furnished by the public works sometimes causes the supply-pipes to become stopped, and one man was employed almost exclusively for looking after the pipes supplying the flushing-tanks with water. The tanks are fed by such a small stream that the very unfit muddy water supplied has a tendency to silt them up and stop the flow. The inspector had to open the cocks full way and blow out the silt.

At Keene the visits of the inspector are made about once in two

weeks, and although the purity of the water supplied generally such that no stoppage occurs, still there have been occasions wh one or two cocks were found to be clogged. Even with the pure water, sediment is to be feared when repairs are made in the wate mains, and the flushing tanks can then become inoperative.

A simple expedient has been proposed that would seem to b effective in preventing clogging of the faucets. This would consist in a float placed in the tank and so connected with the cock that the latter would be automatically turned on under full head when the water rose nearly to the top of the tank. Thus for a few minutes before the water was discharged from the tank the cock would be turned fully on and the sediment would be blown out before it had accumulated in a quantity sufficient to stop the flow altogether.

As the successful operation of the separate system is to a great extent dependent upon the efficiency of the flush-tanks, and, since in many cases very pure water would not be available for filling the tanks, some device for insuring the certain action of the latter, even with very muddy water, should certainly be perfected.

When the tanks are inspected in winter, at times when snow lies deeply on the ground, a bad place is sometimes made in the street, interfering with driving. It might, therefore, be desirable to place the tanks a little to one side of the traveled roadway.

At Keene the mains were thoroughly flushed last spring by turning water into the tanks from the street hydrants, a hose being used for the purpose. By this means the fungus growth was removed for the most part. It would be much more convenient at places where such extra flushing seems desirable to have an arrangement provided by means of which water could be turned into the sewer-pipes directly from the water-mains without the necessity of employing hose.

SUB-SOIL DRAINAGE.

The sewerage system at Keene has not yet been in operation for a sufficient length of time to enable a correct judgment to be formed as to the efficiency of the sub-soil drains.

A well-known authority has said: "In all works of sewerage in order to get their full benefit it is requisite that provision should be made for the drainage of the sub-soil. The mere fact of carrying out a system of sewerage and being obliged to cut through various strata of a more or less retentive character is naturally a means of

securing to a great extent sub-soil drainage; but it is not well to de pend entirely upon the intersection of various geological formation as it has been shown that drainage works when first brought int operation, or during their construction have had greater effect i drying the sub-soil and in reducing the rate of death arising fror phthisical disorders, than has been secured in after years. This ma be accounted for from the fact that the drainage of the sub-soil wa more perfect prior to the complete consolidation of the sewer trenches than it has been subsequently." The earth with whic sewer-trenches are filled is seldom as compact as it was previous to th excavation, sometimes a layer of gravel or sand is placed over th sewers, which should in that case be embedded in clay, and thus th sub-soil secures permanent drainage. At Keene the contract specify that the filling over the sewer-pipes shall be of fine, dr earth.

It appears evident, therefore, that the efficiency of the tile-drair cannot be readily ascertained. At some places in Keene the sul soil has been much dried and wells have failed since the sewers wei built. This may be due to the sub-soil drains or merely to the diggin of the sewer-trenches.

The actual amount of water flowing from the tile-drains, if could be ascertained, would enable a judgment to be formed as t their efficiency. At Memphis where the sewers have been laid for years a very perceptible drying of the sub-soil is said to have take place, but it is uncertain as to the amount of drying that can be a cribed to the tile-drains. It would certainly seem that agricultur tiles laid as at Keene would have some effect in diminishing th water in the sub-soil. It would doubtless be well to lay branches t the cellars when house connections are made with the sewers, espe ially where the houses are at some distance from the latter. If it necessary to discharge the ground-water into the sewers it migh with comparative safety be done at the man-holes where a gate coul be provided to prevent the backing up of sewage during the cor tinuance of high water, or in the event of the sewer-pipe becomin obstructed. At Keene there is certainly danger of sewage bein forced up the sub-soil pipes in the lower part of the city, wheneve the water is high in the river, and if the sewer should be obstructe the sub-soil might be extensively flooded with sewage before the ol struction was discovered and removed.

STORM-WATER.

Surface-water is removed at Keene partly by means of two sewers of large size, which formerly received a certain amount of house-drainage. These sewers follow lines of natural drainage, and although by special resolutions of the city council passed last summer, they can no longer be used as public sewers, they still relieve the ground of much storm-water. In parts of the village outside of the drainage area of these sewers, storm-water is for the most part carried off in ditches at the sides of the streets.

HOUSE CONNECTIONS AND GENERAL ADMINISTRATION.

In order to fully describe the methods adopted for making house connections, the precautions that have been taken to insure the perfect working of the separate system at Keene, and also the plans that have been there devised for the future administration of the system as regards its care and management, the following ordinance is quoted without abridgment:

An ordinance to regulate the house-drainage and the connections with the public sewers.

Be it ordained by the City Councils of the city of Keene, as follows:

SECTION 1. The general care and management of the new sewers now in process of construction by the Drainage Construction Company, in Keene, shall be vested in a board of water commissioners, after the same shall have been completed and turned over to the city, agreeably to the contract between said company and the city, and their power shall be subject to any limitations and restrictions contained now or hereafter in any ordinance, regulation or order of the city councils; and the members of said board shall receive such compensation for their services as may be determined by the councils, but they shall incur no debt against the city, except for necessary repairs and care, unless ordered by the board of mayor and aldermen.

§ 2. The person serving as superintendent of water-works shall also be superintendent of sewers, and he shall receive such additional compensation for his services as the councils may from time to time determine. Said superintendent of sewers shall have supervision of

the construction and repair of all house-drainage, and after the completion of the original contract, shall superintend all repairs of said sewers and their connections; and he shall keep a description, with plans, of the sewer and connections, and an account of all expenses in his department, all under the directions of the water commissioners.

§ 3. Before any house-drain shall have been connected with said sewers, the owner thereof, or applicant, shall pay to the superintendent of sewers the following fees, viz.: For every house-drain, $5 for the connection. And all persons who have made such connections, or shall have made them before the completion of said sewers, shall pay said fees.; and their connections, drains, etc., shall be subject to this ordinance in all respects, and the superintendent of sewers shall see that all such connections, drains, etc., conform to the requirements of this ordinance. All moneys collected by the superintendent of sewers shall be paid to the city treasurer twice a month, and the treasurer shall keep the same as a separate fund.

§ 4. No plumbing, house-drainage or connections shall be done or made in connection with the sewer by any person not licensed to do snch work by the board of mayor and aldermen, under a penalty of $20.

§ 5. The following regulations shall govern the planning of all house-drainage and house connections with sewers:

1. For each building there shall be a separate connection with the public sewer of four-inch salt glazed vitrified pipe, which may extend from the sewer to within five feet of the house, and from thence the house-drain shall be of cast-iron pipe, satisfactory to the superintendent of sewers, and shall extend upwards, so that its upper terminus shall communicate directly with the open air in a manner which shall secure perfect ventilation. That portion of the soil or ventilation-pipe above all fixtures may be of material, and dimensions satisfactory to the superintendent of sewers.

2. No trap or any manner of obstruction to the free flow of air through the whole course of the drain and soil-pipe will be allowed.

3. Every fixture shall be effectually trapped. No sink-drain pipe shall be more than one and one-fourth inches in diameter.

4. No privy-vault or cess-pool shall be connected with the house-drain or sewer. When water-closets take their place, they shall be thoroughly cleaned out, and filled with fresh, dry earth.

5. No sub-soil drain shall be connected with the house-drain at any point, the house-drain being made and kept absolutely tight for

the removal of foul water without the least opportunity for escape into the soil; and drain-pipe, waste-pipe or rain-water conductors shall under no circumstances be connected with the house-drain.

6. Every water-closet shall be adequately flushed with water from a cistern above it; except that, where a cistern is liable to freeze, other methods may be permitted, provided that thorough flushing is secured. No closet shall be used which has a space between two water seals of more than 200 inches capacity, or which has such space of any capacity, every part of the walls of which is not thoroughly flushed and washed at each use of the closet. Every water-closet apartment shall have a direct means of ventilation into the open air.

7. All soil and waste-pipes shall be as direct as possible, and all parts of the work shall be so arranged that they may be at all times readily examined and repaired. Before the fixtures are placed in connection with the plumbing work of any house, and before the soil-pipe is connected with the drain, the outlet of the soil-pipe and all openings into it shall be hermetically sealed; the pipe shall then be filled with water to its top and every joint shall be carefully examined for leakage, and all leaks shall be securely closed before connections with the soil-pipe are made.

§ 6. All drain-laying, repairs and connections shall be made according to the following rules, and if any drain be constructed or repaired, or any excavation made for that purpose without a permit in writing from the superintendent of sewers, or in a mode different from that prescribed herein, the person doingsuch work and the owner or agent directing the same shall respectively be liable to a penalty not exceeding $20 and the person doing such work shall also forfeit his license for a period of six months.

RULES FOR DRAIN-LAYING.

1. Before any connection with the public sewer is made, or any house-drainage put in, or any repairs on them, a permit must first be obtained and the plan proposed approved by the superintendent of sewers.

2. No pipes or other materials for drains can be used till they have been examined and approved by the superintendent of sewers. All the work must be inspected by him and done to his satisfaction.

3. In opening any street or public way, all materials must be placed where they will cause the least practicable inconvenience to

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the public, and the whole inclosed with sufficient barriers and properly lighted at night from the beginning to the end of the work.

4. No street shall be opened until the Y branch of the sewer and the entire course of the drain to be laid shall have been precisely staked by the superintendent of sewers.

5. The least inclination that can be allowed for house drains is one in sixty, without the written permission of the superintendent of sewers.

6. In the "house connection" every joint shall be laid with gasket and cement, and bedded in hydraulic concrete at least four inches in depth. The house-drain and soil-pipe must be calked with lead so as to be both water and air-tight. All joints must be satisfactory to superintendent of sewers.

7. The ends of all pipes not to be immediately connected are to be securely closed water-tight, with imperishable materials. The inside of every drain, after it is laid, must be left smooth and clean throughout its entire length, and true in line and grade.

8. The back-filling over drains, after they are laid, must be puddled or rammed, all water and gas-pipes protected from injury or settling, and the surface of the street made good within forty-eight hours after the completion of that part of the drain lying within the public way.

§ 7. This ordinance is to take effect from its passage, with this reservation, to-wit: that nothing in it shall be construed in a sense that will relieve the joint standing committee on sewers and drains from the performance of certain specific duties in relation to the sewers during their construction as provided in a joint resolution passed January 18, 1883, nor to authorize any connection with the main sewer until the same is delivered to the city by the Drainage Construction Company as per terms of their contract.

Passed July 21, 1883.

There are different opinions as to the advisability of dispensing with the running traps in the house-drains; if they are not used the inhabitants should certainly be warned of the dangers that may arise from defective traps, dangers that will be considerable with the separate system, for, if the water-seal is once broken, the air from the house-drains and sewers will be forcibly driven into the houses whenever the flushing-tanks are discharged.

When a house is to be left vacant for several weeks, it would be well to require the occupants to apply to those in charge of the sewerage system, that they may cause the traps to be filled with crude

or glycerine that thus evaporation may be prevented. If the matter should be left to the attention of the occupants themselves, it would very probably be disregarded, or some unsuitable oil, like kerosene or linseed, would be used as the only cheap article readily obtainable.

Grease-traps are regarded as desirable adjuncts, but their use is not compulsory at Keene, as it is thought that stoppages will occur in the four-inch house-drains before the sewers become seriously obstructed. Only one house-drain has been stopped, as yet, and that was from a mass of coffee-grounds, tea leaves and grease. There were no water-closets in the house in which the stoppage occurred, and no means of thoroughly flushing the drain.

COST OF SEWERAGE SYSTEM AND EXPENSE OF MAINTENANCE.

Allowing for the usual increase of population, the city of Keene would have had about 7,100 inhabitants in 1884. A debt of $70,000, with interest at four per cent, was incurred for the construction of the sewers, to meet the interest of which, a tax of $2,800 per year is levied. The principal of the debt is to be paid off, in four installments of $15,000 each, in 1905, '6, '7, and '8 and the remaining $10,000 in 1909.

During the year ending December 1, 1884, the entire cost of extension and maintenance was $1,161.29.

In 1884 there were 1,795 polls; the rate of taxation was $1.15 per $100, and the total valuation of the city was $5,922,043.

It is, therefore, evident that the construction of the sewers has not imposed a very heavy burden upon the tax payers, since the debt could now be paid by a tax of $1.18 per $100, while the actual cost of maintenance during 1884, amounting to $678.04, would have been covered by a tax of less than twelve mills per $100.

The general sentiment, at Keene, is one of satisfaction regarding the operation and expense of the sewerage system.

EXPERIENCE WITH THE SEPARATE SYSTEM AT NEW BRIGHTON AND AT ROCKAWAY.

Although at these places the separate system has not been used on a large scale, an account of its practical operation will be of interest since this system is said to be especially adapted for small villages and hamlets or even for groups of houses of very limited number.

At New Brighton two lines of pipes, without laterals, are in use. Both of these lines were designed to serve as mains, and they were of such a size as would *accommodate a large number* of houses.

One line of pipes is 3,700 feet long; it has at places an incli tion as small as one in 400. At the outlet this pipe is nine inc in diameter, diminishing to eight inches and then to six inc There is one flushing-tank at the end of this line discharging gallons once every three or four hours; only about forty houses h made connection with the sewer on this line.

The second line of sewers at New Brighton is 4,000 feet in len without laterals, and of four, five, six, seven and eight inches in ameter, increasing toward the outlet. A flushing-tank has been placed at the end of this line, and it is the design to place a sec one at the commencement of the eight-inch pipe.

Man-holes have been placed at intervals along the lines of sew these have gratings over them so as to admit the air freely. It doubtful whether open covers to the man-holes are advisable for purpose of ventilation, as they will serve to prevent the air from ing drawn through the soil pipes in the houses when the flush tanks discharge. The pipes in the separate system of sewers probably in less need of ventilation than the soil-pipes of the ho The metropolitan board of works of London, as the result of t experience during twenty years, have said that "the most efficac mode of preventing the escape of offensive effluvia from the sew is to provide them with such a copious supply of water that the composing matter within them shall be diluted and removed be any noxious gases have been generated;" this is precisely wh done in the separate system, but from the nature of the case a effectual flushing cannot be given to the soil-pipes. Where runni traps are dispensed with, as at New Brighton and Keene, the quent flow of air through the soil-pipes, from the suction produ by the water discharged from the flush-tanks, is probably as effec a method of oxidizing the filthy matters in the house-drains soil-pipes as can be readily devised; hence the covers of the m holes should be tight, so as to render the draught through the pipes as powerful as possible.

Only one stoppage has occurred in the pipes, and that was fro tomato can, which might easily have been kept out of the pipe w proper care.

Sub-soil-pipes were laid in the same trenches with the sewer-p but entirely independent from them. Difficulty was experienc laying the sub-soil-pipes from the intrusion of earth; especiall heavy showers occurred unexpectedly, when large quantities of e would be washed into the pipes. No branches were led up to

cellars from the sub-soil-pipes. Large grease-traps placed outside of the houses, and ventilated by special pipes running up to the roofs, are used to some extent, and are said to be efficient in preventing grease, etc., from passing into the house-drain.

Drains from the cellars leading directly to the sewers have been proposed, but these would have to be provided with a gate to prevent sewage from backing up when an obstruction occurred in the pipes, and the end of the drain passing into the cellar would require to be well sealed by a deep trap, and some arrangement would be needed for supplying the latter with water as rapidly as it evaporated. This arrangement would be a dangerous and unsanitary one unless very unusual care was taken, and it cannot be recommended for general adoption.

Connections with the sewers are made by breaking a hole in the top of the latter and cementing a saddle-piece with a T connection over the hole, so that the house-drainage is discharged into the top of the pipe. Traps in the house-drains are considered objectionable as tending to cause stoppages in the drain while any object that has successfully passed through the house-drain is said never to occasion any difficulty in the sewers.

At Wave Crest, Rockaway, L. I., a four-inch sewer has been laid across a salt marsh for a distance of 2,800 feet. This small pipe is nearly level, the total fall being only three inches, yet during the nine years in which it has been in use no stoppages have occurred and no trouble of any sort has been met with. There are twenty-three houses on this line of pipe, most of which have three water-closets and one or two bath-tubs. A flush-tank at the end of the line of pipe is supplied by means of a wind-mill.

The results of experience with the separate system at New Brighton indicate that the principal difficulties to be met with are those of administration. In small places, where it is difficult to obtain constant inspection by persons thoroughly acquainted with those essentials necessary for the perfect working of the system, trouble may be expected from careless supervision and from bad workmanship in making house connections. Strict ordinances are necessary, and too great care cannot be taken to see that they are thoroughly enforced.

There may be places where good administration could be obtained through companies formed by those of the residents who thoroughly appreciate the sanitary needs of the community. Such companies would provide the people with sewerage in very much the same way

that gas and water are now frequently furnished. The financial succ of a corporation formed for the purpose of providing a means for sew disposal would, however, not be as well assured as though its obj was to supply wants more generally felt. It is not improba that public sentiment would be more alive to defects in the admin tration of a company of private individuals than would be the cas the matter was in the control of the village authorities. In tow and villages where an enlightened public sentiment exists, it wou be in the interest of economy to keep the control of the sewage the hands of the local government, in which case special care sho be taken to secure competent inspection and faithful workmansh

HORACE ANDREWS, JR.

ALBANY, *January* 30, 1885.

SPECIFICATIONS FOR SEWERS IN THE CITY OF SCHENECTADY, N.

1. The sewers shall be constructed of glazed earthenware sew pipe of the best quality (except under the Erie canal, where it sh be of iron), which shall be provided with Y branch connections four inches in diameter on each side opposite every lot in front which it passes.

2. They shall be located on the lines shown on the plans of t work, and will be staked out by the engineer. This line, whene practicable, will be on the center line of the street. The committ however, reserve the right to move the line of sewers to the right left whenever obstructions are met which render a change of li desirable.

3. The contractor will be required to preserve all stakes a bench marks until permission is given by the engineer to remov them.

Excavations.

4. All excavation shall be by open cut from the surface. No tun neling will be allowed, except written permission be previously ob tained from the engineer.

5. Whenever the material is of such a nature as to allow it, th excavation up to the greatest horizontal diameter of the pipe sh be made to conform to the shape of the pipe to be laid in it. Abov this line the cut may, in ordinary cases, be carried to the surface a such a slope as the contractor may choose.

6. Should the contractor think it best to keep the sides of the excavation vertical, by bracing or otherwise, it is expressly understood that it shall be done at his own cost.

7. The sides of the excavation, whenever it shall be necessary in the opinion of the engineer, shall be supported by suitable plank and shoring, but no allowance will be made therefor unless the same is left in the trench by written order of the engineer.

8. The excavation, at the bottom, is to be made and shaped as nearly as possible, to fit the lower half of the pipe to be laid, with holes cut at the joints for the sockets to rest in, so that the pipes shall have a uniform bearing on the ground from end to end. The excavation at the joints shall be at least six inches outside of the joints to enable the joints to be perfectly cemented.

9. At the height of half the diameter of the pipe from the bottom, that is, at the height of the greatest diameter of the pipe, all trenches are to be eighteen inches wider than the greatest diameter of the pipe to be laid therein.

10. The trench shall be dug to within six inches of grade by measurement from the witness stakes on the surface. The last six inches shall be taken out after the grade pegs have been set in the bottom of the trench by the engineer.

11. The approximate depth of the cutting will be marked by the engineer on witness stakes before the excavation is begun. Grade pegs will be set by the engineer every twelve and one-half feet on the center line at the bottom of the trench.

12. In no case, without previous written permission from the engineer, shall more than .... feet of trench be opened in advance of the completed sewer.

13. The material excavated shall be laid compactly on the sides of the trench and kept trimmed up so as to be of as little inconvenience as possible to the traveling public and adjoining tenants.

14. The contractor shall not obstruct the gutter of any street, but shall use all proper measures to provide for the free passage of surface water along the gutters.

15. The contractor shall provide for all water-courses and drains interrupted during the progress of the work, and replace them in as good condition as he found them.

16. The contractor shall keep the trenches free from water during the progress of the work, as no pipe will be laid in water in any case whatever.

Protection of Water and Gas-pipe.

17. The contractor shall do whatever may be necessary to keep in position and to protect from injury all water and gas-pipes, lamp posts, service-pipes and all other fixtures which may be met with in carrying on the work.

In case any of the said gas or water-pipes or other fixtures be damaged, they shall be repaired by the parties having control of the same, and the expense of such repairs shall be deducted from the amounts which may become due the contractor.

Protection against Accidents.

18. The contractor shall erect suitable barriers around all excavations to prevent accidents to passengers on the streets, and shall place and maintain during the night sufficient red lights on or near the work.

19. The contractor shall have charge of and be responsible for the entire line of sewers for whose construction he has contracted until their completion and acceptance.

Back Filling.

20. The earth filled around and on top of the pipes shall be free from stone and tamped with the utmost care, so as to obtain the greatest compactness and solidity possible. In filling, the earth shall be kept at the same height on both sides of the pipe. The earth shall be rammed in layers of not more than one foot thick up to the surface of the street, and in no case shall the number of men filling be more than twice the number of men ramming.

21. The trench must in all cases be filled to the proper grade with suitable material, free from stones over four inches in diameter. Should there be a deficiency of proper material for refilling the trench, the contractor will be required to furnish the same at his own cost.

Repaving and Restoring Streets.

22. Where the pavement has been removed, it must be replaced by the contractor and left in as good condition as it was before being removed.

23. All surplus material and rubbish must be removed by the contractor.

24. All work of restoring the surface of the streets shall be done to the satisfaction of the Superintendent of Public Streets.

Protection of Property.

25. The contractor shall, at his own expense, shore up, protect and make good, as may be necessary, all buildings, walls or fences injured or liable to be injured during the progress of the work; and the contractor will be held responsible for all damage which may happen to neighboring property from neglect of this precaution or from any other cause connected with the prosecution of the work.

Pipes — How laid.

26. All pipes over eight inches in diameter shall be laid with a straight-edge, beveled to grade, furnished by the engineer. One end of the straight-edge shall be placed on the nearest grade peg and the other on the flow-line of the pipe to be laid, and the height of the pipe shall be so adjusted that a builder's level placed on the upper edge of the straight-edge shall be perfectly level. The level used for this purpose must be kept in perfect adjustment by the contractor.

All pipes eight inches and less in diameter shall be laid in the following manner: A mason's line shall be tightly stretched parallel to the grade and slightly above the sockets of the pipes. This line will be supported over the center at distances not greater than twenty-five feet apart. The exact grade for each pipe shall be obtained by measuring down from this line.

27. Especial care must be taken to lay the pipe to the exact grade and line.

28. All pipes previous to being lowered into the trench shall be fitted together and matched, so that when jointed in the trench they may form a true and smooth line of pipes.

Joints.

29. A gasket of oakum or other material approved by the engineer shall be pressed into the joint around the entire circumference of the pipe to prevent the entrance of cement to the inside of the pipe. No joint shall be cemented until the gasket of the next joint in advance has been completed.

30. The cement shall be pressed into the space between the socket and spigot so as to entirely fill the space, and the bevel joint at the end of the socket shall be smoothly and evenly made.

Special care must be taken to make perfect joints at the bottom of the pipe.

31. The excavation made for the socket of the pipe shall be filled with sand to support the cement firmly in position. When water accumulates in this excavation it must all be removed with a syringe or sponge before the joint is made.

32. When the joint is completed, great care must be taken not to disturb the pipes.

Cement.

33. The cement for filling the joints shall be pure, fresh-ground Rosendale cement of best quality, with only enough water added to give it the proper consistency, and shall be used as soon as mixed.

Branches, "Ts," etc.

34. The "Y" branches, "Ts," lamp-holes, hand-holes and man-holes shall be placed at points indicated by the engineer. Their location will be indicated by stakes driven at the sides of the trench.

The "Y" branches shall be elevated to correspond to the lateral sewers and house-drains entering them. They shall be closed with an earthenware cap, and the space above the cap shall be filled with sand covered with a thin coating of cement.

Sewers to be kept clean and free from water.

35. All the pipes must be kept thoroughly clean, and no water will be allowed to flow through them in any case whatever, during the construction of the sewers.

36. When the trench is left for the night, or the pipe-laying is stopped by rain storms or any other cause, the ends of the pipes must be closed water tight with a plug and cement or with bricks and cement, as the engineer may direct.

37. When running quicksand or other treacherous ground is encountered, the work shall be carried on day and night should the committee so require.

Artificial foundation.

38. Whenever ordered by the engineer, in writing, the contractor shall excavate to such depth below grade as the engineer may direct, and the excavation shall be brought to grade with such material as shall be ordered by the engineer; the extra work to be paid for upon the estimate of the engineer.

If the contractor excavate below grade without orders, he will be required, at his own expense, to fill the excess of excavation with such material as the engineer may direct.

Concrete formations shall be placed under the flush-tanks and man-holes when so directed by the engineer.

Hand-holes.

39. At intervals of 100 feet a piece of sewer pipe shall be laid having a detachable section on the upper surface so that access may be readily obtained to the interior of the pipe.

Lamp-holes.

40. Lamp-holes shall be constructed by placing a six-inch "T" branch vertically in the sewer and bringing it up to within one foot of the street surface by adding pipes of the same diameter. The top of the lamp-hole shall be protected by a cover as shown in the detail drawings.

Man-holes.

41. The man-holes shall be constructed of hard brick laid in cement mortar. The thickness of the wall shall be eight inches. The form shall be a truncated cone, five feet in diameter at the bottom and two feet at the top. The bottom shall be on a level with the bottom of the sewer-pipe and the top on a level with the street surface. The top shall be covered with a cast iron perforated cover, with dust pan underneath. (See drawings.)

Cement Mortar.

42. The cement mortar for man-holes, lamp-holes and concrete shall be made of best quality of fresh-ground Rosendale cement and clean, sharp sand, in the proportion of one measure of cement to two of sand. The sand and cement shall be thoroughly mixed dry and such quantity of water added so as to form a paste of the proper consistency. All mortar to be fresh for the work in hand. No mortar that has begun to set will be allowed to be used.

Concrete.

43. The concrete used on the work shall be made of stone, broken so as to pass through a two-inch ring, and cement mortar. The stone shall be free from dirt. The cement, sand and stone shall be

mixed in the proportion of one of cement, two of sand and two of stone.

Materials — How furnished.

44. All pipes and other materials shall be furnished by the contractor.

Materials to be inspected by Engineer.

45. No materials of any kind shall be used in the construction of the sewers until they have been examined and approved by the Engineer.

Freezing Weather.

46. No pipes or masonry will be allowed to be laid in freezing weather.

Disorderly or incompetent Workmen.

47. If any person employed by the contractor on the work shall appear to the Engineer to be incompetent or disorderly, he shall, on the requisition of the Engineer, be immediately discharged, and such person shall not be again employed upon the work without the permission of the Engineer.

Length of Sewer.

48. The length of the sewer will be measured on the centre line of the pipe.

Interpretation of Term.

49. Wherever the word "committee" is used in these specifications it shall be held to mean the "Committee on Sewers" of the Common Council of the City of Schenectady, N. Y.

50. Wherever the word "engineer" is used it shall be held to mean the Engineer in charge of the sewers, or his authorized assistant.

51. Wherever the word "contractor" is used it shall be held to mean either any contractor or firm of contractors, or any member of a firm contracting for work herein specified.

52. Bids shall state the price per lineal foot of pipes of each size laid as herein specified, and for the various depths named, which price shall be in full for all labor and materials required for the complete execution of the work; also the price for each man-hole, flush-tank and lamp-hole complete.

53. Payments for the work will be made monthly upon the estimate of the Engineer. Twenty per cent ($\frac{20}{100}$) of the amounts due will be retained as a guarantee against poor workmanship and materials. One-half of this reserve will be paid as soon as the work is completed and accepted and the other half after the expiration of one year after the acceptance of the work.

SCHENECTADY SEWERS.

PROPOSAL FOR FURNISHING MATERIALS AND CONSTRUCTING SEWERS IN THE CITY OF SCHENECTADY, IN ACCORDANCE WITH THE SPECIFICATIONS HEREWITH ANNEXED:

Items.	Prices.
Price per lineal foot for furnishing and laying 18-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 15-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 12-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 10-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 8-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lineal foot for furnishing and laying 6-inch pipe, including Ys, branches, detachable covers and cement joints	
Price per lamp-hole, including all materials and labor	
Price yer man-hole, including all materials and labor........	
Price per flush-tank, including all materials and labor........	
Price per lineal foot for all excavation and back filling under 6 feet........	
Price per lineal foot for all excavation and back filling over 6 feet and under 8 feet........	

Price per lineal foot for all excavation and back filling over 8 feet and under 10 feet..................................

Price per lineal foot for all excavation and back filling over 10 feet and under 12 feet..................................

Price per lineal foot for all excavation and back filling over 12 feet and under 14 feet............. ....

Price per lineal foot for all excavation and back filling over 14 feet and under 16 feet..................................

Price per lineal foot for all excavation and back filling over........ 16 feet and under 18 feet..................................

Price per lineal foot for repaving...............................

The undersigned hereby propose to the City of Schenectady to furnish all the materials and perform all the labor necessary to complete such amount of the above mentioned work as shall be awarded to the undersigned by the said city or the Committee on Sewers of the Common Council of said city, at the prices named in the preceding proposal, and on the acceptance of this proposal do hereby bind to enter into a contract with the said city, at such time and place as shall be required by it, to perform the said work before the day of 188 , for the consideration and at the prices named in the foregoing proposal. Also to furnish such security as may be required for the faithful performance of the work, the payment for materials contracted for, and for the payment of laborers' wages and liens which may arise therefrom.

Dated at Schenectady, N. Y., the day of 1884.

Contractor's signature, [L. S.]

Postoffice address,

BIDS FOR CONSTRUCTING SCHENECTADY SEWERS.

	Price per foot for excavation and back-filling, under 6 feet.	Price for excavation and back-filling, 6 feet and under 8 feet.	Price for excavation and back-filling, over 8 feet and under 10 feet.	Price for excavation and back-filling, over 10 feet and under 12 feet.	Price for excavation and back-filling, over 12 feet and under 14 feet.	Price for excavation and back-filling, over 14 feet and under 16 feet.	Price per lineal foot for furnishing and laying 8-inch pipe.	Price per lineal foot for furnishing and laying 10-inch pipe.	Price per lineal foot for furnishing and laying 12-inch pipe.	Price per lineal foot for furnishing and laying 18-inch pipe.	Price per man-hole, including materials and labors.	Price per flush-tank, including materials and labors.	Price per lamp-hole, including materials and labors.	Price per lineal foot for re-paving.	Total.
	cts.	cts.	cts.				cts.	cts.	cts.					cts.	
Samuel Moak	16½	22	90	$ 93	$ 40	$ 45	25	34	41	$ 60	$48	$47	$5 50	08	$37,571 30
Hinds, Moffat & Co	24	46	70	96	1 12	1 82	23	31	38	65	42.02	72.25	8 20	05	40,887 55
J. A. Hallnan	27	35	80	1 00	1 50	3 30	22	30	38	82	51	76	10 00	04½	42,658 00
Doyle & Stanton	37	43	54	59	72	90	18	27	35	52	38	40	2 25	12	41,096 70
Robert Bryce	27	29	34	39	55	95	23½	31½	38	66	54.75	85.50	8 79	05	37,052 60
Spaulding & Lenane	42	47	62	90	1 05	1 20	18	27	33	57	45	55	5 50	12	45,672 50
B. J. Coyle	37	45	50	56	62	70	33⅓	50	60	1 00	30	45	10 00	07	49,720 67
S. E. Babcock	28	33	48	60	70	1 00	25	33	38	75	40	50	1 75	07	39,043 70
Sloan & McIlvain	34	41	52	63	74	87	27	34	39	59	25	50	8 00	05	41,895 20
Sherman & McDonald	25	36	53	95	1 50	2 00	24	31	36	58	45	65	7 50	20	45,404 60
W. E. Dean	20	40	60	1 10	1 25	1 50	23	33	47	60	36	50	4 00	10	39,993 80
B. Van Vranken	13	20	30	35	40	50	19	26	32	55	30	35	6 00	03½	25,369 10
J. McEncroe	22	28	75	85	95	1 10	17	23	27	49	34	40	7 75	08	34,323 20
S. V. Trull	13	16	18	20	30	38	18	30	39	50	40	30	1 50	01	22,460 10
M. Nolan	11	26¾	42½	55	82¼	98	16¾	24½	30	58¼	37.27	44	5 00	05½	27,179 32

The contract was taken by Mr. Van Vranken, and the sewers are being constructed by him.

REPORT

ON

DIPHTHERIA AT SANDY HILL.

Application having been made to the State Board of Health to investigate the occurrence of diphtheria at Sandy Hill, Dr. Curtis and O. S. Wilson, C. E., were sent to make, respectively, an examination of the medical history of the disease, and of the physical conditions of the place.

Suspicion resting upon the potable water of the village, specimens from twenty wells and springs were taken and their character examined microscopically by Dr. Hailes, who also made a determination of the quantity of chlorine in these waters, as a test of probable sewage contamination.

The reports of Dr. Curtis, Mr. Wilson and Dr. Hailes were then submitted to Dr. Carroll, Secretary of the Board, for careful consideration, and for a report from him thereon.

The special outbreak of diphtheria at a new school-house in Sandy Hill is carefully discussed by Dr. Carroll, together with the general conditions of the village. The committee fully approve and indorse his conclusions and recommendations.

Committee on Drainage, Sewerage and Topography.

JAMES T. GARDINER, *Chariman,*
ERASTUS BROOKS,
GEO. W. COOKE, M. D.,
EDWARD MOORE, M. D., *President,*
ALFRED L. CARROLL, *Secretary.*

The above report was approved by the State Board of Health May 14, 1885.

ALFRED L. CARROLL,
Secretary.

CONCLUSIONS OF DR. ALFRED L. CARROLL,

To the Committee on Drainage, Sewerage and Topography:

Dr. Curtis' report, showing the incidence of diphtheria at Sandy Hill for several successive years, chiefly during the winter months, seems to point to pollution of the ground-atmosphere as a factor in the outbreak at such seasons when the closure of doors and windows diminishes ventilation, and the artificial warmth of house interiors exerts a certain suction upon the fouled air contained in the surrounding soil; and it is probable that this factor, in the present as well as in past years, has borne its part in localizing and intensifying the effects of other insanitary conditions. Indeed, the earlier cases in the vilely arranged tenement described by Mr. Wilson may be reasonably ascribed to domiciliary filth-poisoning.

In the present unsatisfactory state of knowledge concerning the etiology of diphtheria it is impossible to determine accurately the relative influence of personal contagion, transportation by specifically infected articles, or pollution of air or water; but there is sufficient evidence to warrant the opinion that the disease is often, if not commonly, generated *de novo* from the products of putrefaction of organic (usually animal) matter; and that the contamination of either the respired air, or the drinking water, by such products can, under certain as yet undefined conditions, give rise to severe outbreaks. In the instances under consideration the school-house appears to have been a central focus, though, in the absence of positive data respecting the school-attendance and domestic history of the children affected, the character and extent of its agency cannot be precisely estimated; and we are left to the alternative hypotheses that the infection may have been imported from a preexisting source and spread through school intercourse, or that it may have originated in the school, and been carried thence to the surrounding neighborhood. The cessation of the epidemic soon after the closure of the school lends probability to the latter supposition; but the prior existence of the malady, and the lack of connecting links between the cases occurring in adults and infection arising in the school render it probable that some of these examples are due to purely local causes. The appended reports afford indications of widespread contamination of soil and water, favored by the porous nature of the superficial layer, and the impermeability of the subjacent strata. In addition to the soakage from the cemetery, uncemented privy-pits everywhere contribute their foul leachings to

the ground-water wherein wells are sunk, and the examinations by Dr. Hailes show that many of these wells are laden with decomposing organic matter. Without entering into the minutiæ of the "germ theory," it may be stated that the multiplication of bacteria implies the existence of decomposing or decomposable organic matter; and that the commonest variety of these microscopic fungi is believed to be the special ferment of putrefaction of albuminoid substances, with the resulting evolution of sceptic poison. The rapidity of the development of colonies of bacteria in a perfectly sterilized gelatin preparation, inoculated with the water under examination, is regarded as indicating approximately the degree of dangerous pollution. In this respect Dr. Hailes shows that nearly all the wells at Sandy Hill are contaminated; but other data in this report render it probable that the contamination proceeds from different agencies. Chlorine, when present in excess of the amount derivable from natural sources, is very commonly significant of pollution by excremental matter; urine containing a large proportion of it. The great quantity of chlorine in some of the wells would warrant a suspicion that in these soakage from adjacent privy-pits is the chief origin of fouling. But in other instances (and notably in the school-house well and its vicinity) it is noticeable that with a much smaller percentage of chlorine, the development of bacterial life is even more rapid, and in such cases the drainage from the cemetery may be the principal factor.

Whatsoever uncertainty may exist as to the immediate causation of the outbreak of diphtheria, there can be no doubt that the insanitary conditions prevailing at Sandy Hill are sufficient to endanger public health, and to intensify epidemic diseases, and that energetic measures should be adopted for their abatement. Under the peculiar geological and topographical circumstances of the village, sewerage is, even more than elsewhere, a sanitary necessity; and, while awaiting the construction of sewers, the use of uncemented privies should be at once abandoned, their contents removed, with free employment of disinfectants, and some dry-method of excrement disposal substituted in their stead. But even if this be done, a long time will be required for the complete oxidation of the organic filth with which the soil is loaded, and the surface-wells will still be subject to contamination. Until a pure and wholesome water supply can be obtained the inhabitants should be cautioned to boil the well-water before drinking it. This precaution should be enforced as regards the school well, if it be necessary to use it at all.

The tenement referred to in Mr. Wilson's report should be condemned as unfit for human habitation, its owner compelled to rectify the glaring defects in construction, and its occupants forced to observe sanitary regulations.

As regards the cemetery, no future interments should be permitted in it, and its surface should be, as far as possible, planted with rapidly growing trees and herbage. A. L. C.

REPORT OF DR. F. C. CURTIS.

To JAMES T. GARDINER, Esq., *Chairman of Committee on Sewerage, Drainage and Topography:*

SIR — Under your direction, and in company with Mr. O. S. Wilson, C. E., I made a visit to Sandy Hill, Washington county, on the 26th January, to make an inquiry into the etiology of an unusual prevalence of diphtheria, which had been reported to the State Board of Health.

Three cases of this disease occurred in July, all of them in one family, two proving fatal. The epidemic proper, however, developed about the middle of December. On the 13th, a child seven years of age was taken. Three days later another child was taken, in another family, at a distance of two blocks. Both of these were fatal cases. On the same day two other cases were reported, one a child, the other an adult. On the 20th, four new cases developed, three of them being members of one family, and all under eight years of age. Five fresh cases arose on the 22d; two were children nine and ten years old, one an adult, and the other two a mother and child.

These were the last cases to occur at this time. A month later, during the latter part of January, three cases developed, two adults and a girl of twelve. No new cases have since been reported. In all, nineteen cases have occurred, of which thirteen broke out during one week in December. There were in all four deaths.

The history of Sandy Hill shows that cases of diphtheria have been of yearly occurrence. The health officer, Dr. C. L. Infield, and his predecessor, Dr. Wilson, informed me that there are few years in recent time in which a few cases have failed to be developed as the cold months came on. Four years ago they were especially numerous, three of them then terminating fatally. This outbreak especially affected the central part of the village.

Sandy Hill consists for the most part of two main streets, parallel, in a northerly and southerly direction, with a number of cross-streets between them. It chiefly lies along the margin of an abrupt elevation or plateau, a little distance back from the Hudson river, which is here a rapid stream without overflowed banks. It is in an extensive rolling plain surrounded by low hills some miles distant. The village, of nearly 3,000 population, has wide, cleanly streets, with houses generally well built in neat and roomy yards, very few being of a poor class, and the place has a remarkably clean and attractive appearance. It seems to have every facility for perfect ground drainage, but of this Mr. Wilson will report more accurately. It has no public water-supply, yard-wells being altogether used. Nor is there any attempt at drainage. Few houses are said to be supplied with excavated cess-pools, house-slops being thrown upon the surface. The ordinary hidden pit is the universal resource.

Of the three cases of diphtheria which occurred in July, and separated by several months from the present epidemic, it need only be said that, occurring in one family, in a tenement occupied by five families, all of them separate in every respect, however, and with the premises not kept in a sanitary condition, they arose from local causes entirely. Mr. Wilson examined these premises, and I refer you to his report.

Of the present outbreak, you will observe that thirteen of the sixteen cases made their appearance from December 13th to 22d. Practically these cases may be said to be simultaneous.

Another point of interest in the study of these thirteen cases is that all but three of them were under ten years of age.

A third feature is that, occurring thus suddenly, the cases appeared in no one locality, but remote from each other. They were for the most part found in the southerly portion of the village, but not in a circumscribed point, nor did those nearest to each other occur in chronological order.

These prominent characteristics, (*a*) sudden outbreak and cessation, (*b*) age of the subjects, (*c*) extended distribution, indicate its dissemination from a common center, as a school, or its general and simultaneous distribution in milk or other article of food. The former, to which attention had been directed before our visit, satisfies the conditions, and was the undoubted cause of a large part of the cases.

This school building was erected last summer, and finished for

occupancy in September. It is a neat wood structure, one story high, on hewn stone foundation, without cellar or basement, and abundantly capacious. It is a primary school, the main school being some distance away. It is in the southern limits of the village, on a site never before occupied, with few buildings adjacent, and with capacious premises. An old cemetery stands on higher ground not far distant. The school seems, in fact, to be built in a depression of the plateau, and below the general surface. Dwellings surround part of the large block in which this burial ground is located. Near the school is a recently dug well. Its water has been found to show evidence of decomposing organic matter in abundance, and I have no hesitation in saying that it was the cause of diphtheria in the cases of nine school children who made use of it. Just this cause has been found in other outbreaks of diphtheria, which I need not cite to you. The school was opened in September and closed on the 18th of December for vacation. It has been advised that further use of this well be discontinued.

There remain several cases which are not to be accounted for in this way. Some of these localities, six in all, I found time to visit. They were all adults, except one, the child of a mother who was herself affected. My belief is that all of these will be found traceable to polluted drinking water. They were in the families of persons of comfortable surroundings, and under general cleanly conditions. In one I found the well, the water of which was declared to be excellent, not fifteen feet from a deep privy vault; here the mother was seriously ill with diphtheria, three small children with others of the family escaping.*

In another case, two members of the family being affected, the well ten feet deep, is close to a stable, and its water at times is said to have an offensive taste. Being now frozen a sample from it could not be procured.

In a family living quite near the school another case was found, and the water of their well will doubtless be found identical with that of the school.

It is well known that polluted water is often used with impunity for a long time and then suddenly becomes operative in producing diphtheria. The causes for this are not altogether clear, but they probably lie in the direction of the persons becoming accustomed to it, and resisting its effects by usage; in the season of the year, since

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* See No. 6 of Dr. Hailes' report.

diphtheria flourishes but in the cold months; and in changes in the depth of water in the well, and the concentration of the pollution of the water. It is not now for the first time that this disease has developed in this locality, and it is now more prevalent, chiefly because of the school well affecting so many.

It appears a matter of so much interest to the inhabitants of this village, that a considerable number of samples of water, not only from wells of those affected, but from various parts of the village, were procured, and will be analyzed and reported on to you by Dr. Hailes. Some of these are affected by the cemetery possibly, which is so situated as to favor drainage into them. But in a large village without sewerage and with yard wells, it is not necessary to look for local causes of contamination of wells. The remedy, if found to be needed, you can suggest much better than I am able to do.

Very respectfully,

F. C. CURTIS.

MR. WILSON'S REPORT.

JAMES T. GARDINER, Esq., *Chairman of the Committee on Drainage, Sewerage and Topography of the New York State Board of Health.*

SIR — On the 26th inst. I visited Sandy Hill, and investigated the surroundings of the school-house on John street, and herewith submit the following

REPORT.

Sandy Hill has a population of about 2,800. It is situated on the east bank of the Hudson river, which at this place has considerable fall, and is used as power for manufacturing. The larger portion of the village is situated on a sandy ridge or plateau, a few hundred feet back from the river, which rises abruptly about fifty feet and, about one-half mile back from the river, slopes off gradually to the east. This ridge, which has quite a slope to the south from near the center of the village, runs about parallel with the river. The low land along the river is being built upon for residences, paper-mills, etc. (See appended sketch.)

UNDERLYING STRATA.

The ridge in the southern part of the village, in which the school-house complained of is situated, is comparatively flat on top for a

and prove deleterious to health, although its effect may, perhap less than that of the water.

PROPOSED REMEDY.

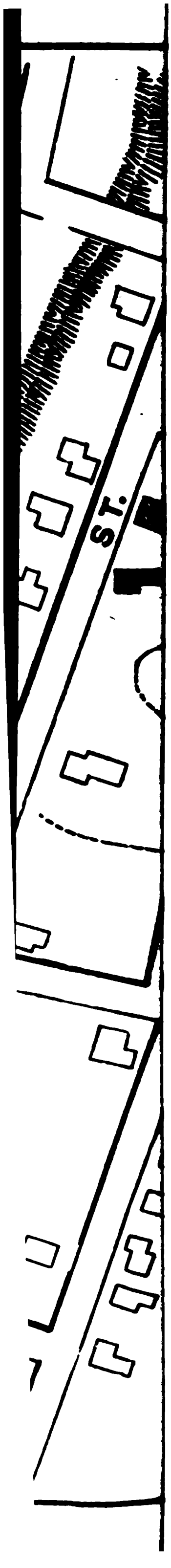
I recommend a water supply, to be brought in from out That most readily available is the Hudson river. The Holly sys properly put in, would give satisfactory results. I also recomn a system of sewers, for sewage only, known as the "separate tem."

These works would involve a considerable outlay of money, would be a profitable sanitary investment, as well as a great venience to all residents of the village.

If any plan for furnishing the village with a water supply seem practicable, individual citizens could try and improve their drin water by boring, or driving wells, through the clay to the rock be but in such wells the surface-water should be cased out. A villag dinance should be passed, and enforced, requiring a proper in tion of such wells, when put in, to see that this casing-out of sur water is thorough, or the lower ground-water will become poll Whether such a supply of water will be feasible, or, if found wholesome, can only be ascertained by experiment.

Unless a system of sewers is put in, a change should be ma to the disposal of sewage. The privy vaults should be cleaned filled with earth, and some of the various methods in vogue adc for getting the sewage away from the village.

From the casual observation I was able to make, I would su that a more thorough inspection of the surroundings of all dences be made. The unusual death-rate in a tenement-h owned by Mr. Howland led me to suspect local causes of water lution. It is a long two-story house, divided to accommodate families. (Its location is shown on sketch, just west of the a head.) The privies are in sheds back of the house and a twenty feet from the wells, of which there are four, situated in cellar bottoms. These cellars are excavated in the sand; the toms are wet, and only about eighteen inches above the water face in the wells, while the soakage from decaying vegetables, barrels, etc., pollutes the ground-water so near by. I predict the test to be made of water from these wells will show them highly injurious for drinking and culinary purposes. How n similar cases there may be in the village only a thorough in tion will show.


ST.

I believe a system of water supply and sewers the only safe remedy for the evils with which this pleasant village is so constantly threatened.

Respectfully submitted,

O. S. WILSON,
Civil Engineer.

ALBANY, *January* 31, 1885.

DR. HAILES' REPORT.

PATHOLOGICAL LABORATORY, ALBANY MEDICAL COLLEGE,
ALBANY, *February* 9, 1885.

ALFRED L. CARROLL, *Secretary of the State Board of Health:*

DEAR SIR — I have received and examined twenty specimens of water from Sandy Hill, N. Y. Below are the results of a biological analysis.

No attempt has been made to determine the number, nature or species of the micro-organisms, the desire being simply to ascertain approximately the degree of pollution of the various samples of water.

They all show a marked contamination either from surface or soil soakage, and the specimens show, pretty generally, a very large admixture of micro-organisms. Any water open to such sources of contamination is unsafe for drinking purposes, on account of the close relation existing between putrefaction and disease.

WM. HAILES, M. D.,
Albany, N. Y.

TABLE.

No.	NAME AND LOCALITY.	Date of culture.	Time of first appearance of micro-organisms.	Time of liquefaction of surface of gelatine.	Depth of liquefaction on 9th day.	Description of micro-organisms.	No. of colonies in 1 cu. c.	Observations, etc., upon the number, size and microscopic appearances of the colonies of micro-organisms.	Chlorine in parts of 100,000.
			days	days	inches				
1	Well of Howland tenement-house (north end), No. 1..	Jan. 31, '85. 5:15 P. M.	2¾	2½	½	....	...	Numerous large and small colonies, pigmented gas............	1.2
2	Well of Howland tenement-house (north end), No. 3..	"	1¾	3	⅛	....	...	Numerous medium and small-sized colonies, gas	5.55
3	Well of Howland tenement-house (north end), No. 4..	"	2	3½	⅓	....	...	Numerous large and a moderate number of medium-sized colonies, pigmented......	1.25
4	Well of Howland tenement-house (south end), No. 5..	"	1¾	3	⅓	....	....	Very numerous small and moderate number of medium-sized nebulous colonies, gas in abundance	2.4
5	Well of Wm. Thomas, Main street (deep well)	"	1½	3	¼	....	....	One very large colony with gas, and very numerous colonies of micro-organisms, very minute..	3
6	Well of Patrick Cox, Main street west of Cemetery...	"	1¾	3	¼	.	....	Two large nebulous colonies and numerous medium-sized colonies	1.95
7	Well of Mrs. Sweet, Main street opposite P. Cox's	"	2¾	8	upon surface	..	..	One large colony and a small number of small colonies	10.6
8	Well of Monty Gibson, first house west of school (12 ft. deep, not below hard-pan)........................	"	3	5	⅝	...	....	Four large and a few small colonies, light brown pigment......	4
9	Well of N. E. Packer, second house west of school (well 20 ft. deep).............	"	1¾	3¾	½	....	....	A moderate number of small and medium-sized colonies..........	1
10	Well of Loran Allen, corner Main and John streets...	"	2⅔	3	entirely	....	...	Exceedingly large colonies, gelatine all broken down	1.8
11	Well of Thomas Glenn, Oak street, east of school .. .	"	2¾	3	1	....	....	A few large pigmented colonies and a few small ones	7.5
12	Well of Harper Rogers, Elm street	"	1⅔	3	⅙	....	....	Several large and many small nebulous colonies	3

								moderate quantity of medium-sized colonies	3
16	Spring of Thomas Norton, Sumpter street	"	2¾	3	2	....	...	Four very large colonies, ½ inch in diameter	2.65
17	Spring of J. F. Mosher, in rear of house	"	1⅘	3½	¼	...	...	A few large and many medium and very small-sized colonies, lightly pigmented	2.5
18	Well of A. Kingsley, 22 ft. deep, privy 50 ft. distant	Jan. 6, 1885 11 P. M.	2½	8	⅛ on 3d day	.	....	Very numerous medium-sized colonies, nebulous slightly pigmented gas	s 2.4
19	Well of Middleworth house, privy 50 ft. distant	....	2⅜	8	⅛	...	....	Fifteen distinct large colonies, also a few small ones	s10.8
20	Water from school-house	....	1¼	2	1½	....	....	Exceedingly numerous nebulous colonies; bacterium termo and very numerous short rod bacilli.	-

SANITARY CONDITION OF CANAJOHARIE, N. Y.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health of Canajoharie, N. Y.:

GENTLEMEN — In response to the complaint made to this Board a nuisance existing in your village which ought to have been abat- by the local authorities, a sanitary inspection of Canajoharie was dered and Mr. O. S. Wilson was sent to make the inspection. E report on the sanitary condition of the village is herewith transmitt- for your information with the hope that you will use every effc to remedy the evils which are pointed out.

On behalf of the Board,
ERASTUS BROOKS,
Committee on Drainage, Sewerage and Topography.

INSPECTOR'S REPORT.

To the Chairman of the Committee on Drainage, Sewerage a Topography of the New York State Board of Health:

SIR — In accordance with your instructions I visited Canajoha April 30th to investigate a complaint made against a privy in th village. As it is only one of the many nuisances existing there, submit the following report on the

SANITARY CONDITION OF THE VILLAGE.

It is an old settlement situated at the foot of and upon the bluff on t south side of the Mohawk river at the mouth of Canajoharie cree The population is about 2,000.

There are two private water companies which supply water to small portion of the inhabitants. The main dependence is upon dinary wells, especially in the lower portion of the village where t land is nearly level and saturated with sewage from cess-pools ar privy vaults. There is a pipe sewer from the foot of the bl along street, emptying into a covered State ditch on t south side of the canal. This sewer was put in for storm water, b takes sewage from several places. It became offensive, but is nc flushed occasionally during warm weather with a hose from a fi hydrant turned into the upper end. This sewer should be continu to the river and would then answer for the main outlet sewer for t village, which needs a system of sewers very badly. There are fe private sewers emptying into the creek.

NUISANCES ON STATE LAND.

In the early days of the canal Canajoharie creek, in the villag was used as a place for loading and building boats, but was aba doned forty years ago. During the warm summer months the wat is very low in the creek with little or no surface current. Alon this creek, especially on the west side between Little Mohawk an

Mill streets, the people living along the bank and a few others throw ashes and garbage into the canal bed. High water carries some of this down stream, but at present there are about one hundred wagon-loads of material, mostly ashes with several loads of manure from a stable and all sorts of garbage and filth deposited along the creek above the water surface, creating a stench and a nuisance. I would suggest that your honorable Board order the local board of health to have this material cleaned out at once. The people living on the bank should bear the expense.

Along the berme bank of the canal in the west end of the village there are a number of pig-stys that are a nuisance. I would suggest that the Superintendent of Public Works be requested to order them taken off at the owners' expense.

OTHER NUISANCES.

There are at least fifty places in the corporation where swine are kept, some of which have been complained of. They should all be removed from the village. An ordinance should be passed and enforced forbidding swine to be kept within, or within a certain distance of, the corporation, as it is practically impossible to keep swine in a village without causing a nuisance.

Little attention seems to be paid to the ordinance requiring all privy vaults to be cleaned every spring. The local health officer recently appointed seems to see the necessity of improving the sanitary condition of the village. The local board of health should be more active. If the above statements do not prove this, I will add that there are several houses in the west end of the village without privies or cess-pools, where slops and garbage are thrown into the streets and upon the land of the West Shore railroad opposite. I take pleasure in stating that the privy complained of has been cleaned within a week under orders from the local health officer. There are about three hundred more that need attention.

Respectfully submitted,

May 8, 1885. O. S. WILSON, *C. E.*

SLAUGHTER-HOUSE NUISANCE AT JORDAN.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health of Jordan, N. Y.;

GENTLEMEN — In response to the complaint concerning a slaughter-house in the village of Jordan, inspection was ordered by this Board. The report of Mr. O. S. Wilson is herewith transmitted for your information with the recommendation that the local board of health take the necessary means to abate the nuisance substantially as pointed out in the report of the inspector.

On behalf of the State Board of Health,

ERASTUS BROOKS,
Committee on Drainage, Sewerage and Topography.

INSPECTOR'S REPORT.

To the Chairman of the Committee on Drainage, Sewerage and Topography of the New York State Board of Health:

SIR — In accordance with your instructions, I inspected the slaughter-house of Crofut Brothers, at Jordan, May 7th, and report as follows:

It is an old structure within the corporation, and has been used more or less constantly for slaughtering animals for many years. About 800 to 1,000 cattle, 1,000 hogs, besides sheep, veal, etc., are slaughtered here annually, at least eighty per cent of which is sold and used in Auburn. The building with the accompanying pig-pens are situated close to the edge of Skaneateles creek on low land, and can hardly be arranged to prevent it being a nuisance. Part of the winter accumulation of refuse, including ten ton of bones, has been recently removed. It is still far from being in good sanitary condition. While a slaughter-house may be a necessary adjunct to a village, it seems wrong that so many animals should be slaughtered in the corporation of Jordan for the Auburn market. There is another firm selling meat in Jordan, having a slaughter-house within the corporation but below the main portion of the village. I heard no complaint against that, however. When the Messrs. Crofut opened a market in the village recently it had the effect of reducing the price of meat to the consumers about twenty-five per cent, so while many desire to have the slaughter-house removed or put in better sanitary condition, there is no desire to drive their market from the village.

It is, in my judgment, impracticable to render the present building and site unobjectionable for slaughtering purposes, and it should be removed if the village authorities really desire to have good sanitary surroundings.

It would be unjust after making the statement above not to call attention to the unsanitary condition of the rest of the village. Nearly every place shows the need of better sanitary inspection and the enforcement of well-recognized sanitary ordinances. A drain in the main business portion of the village, laid to carry off storm water and emptying into the canal feeder, is polluted by the slops from the hotel owned by the president of the board of trustees, and is a nuisance, in violation of State and village laws. Several privies empty into the canal contrary to said laws.

The local board of health seems careless and unwilling to do its duty lest it meets with opposition and trouble as well as loss to its private interests.

Respectfully submitted,

O. S. WILSON, *C. E.*

May 9, 1885.

POLLUTION OF L'HOMMEDIEU CREEK.

Complaint.

HON. EDWARD M. MOORE, *President Health Commissioners, Albany, N. Y.:*

DEAR SIR — On the 23d day of August, 1884, there was presented to the board of health of the town of Montour, in Schuyler county, New York (village of Havana), a notice, a copy of which is hereto annexed and marked Exhibit "A."

Thereafter the board of health of the said town took action and declared the offense complained of a *nuisance*, but the same was not, nor has it since been, abated. The local board's action is set forth in a letter from the town clerk of the town of Montour, who is its secretary, a copy of which is hereto annexed and marked Exhibit "B."

The situation and location of the *nuisance* is shown in the annexed Exhibit "C," which also shows the distance of several residences of those who made the complaint as well as the other dwellings contiguous.

The residences designated have been occupied for years, and all are surrounded by improvements, some of them of an elaborate and expensive character.

Attention is called to the affidavit of Jerome C. Dutcher, hereto annexed and marked exhibit "D," showing the offensiveness of the *nuisance* and the pollution by it of the waters of L'Hommedieu creek.

The parties maintaining and operating this *nuisance* do not live on the same premises. It was moved and placed thereon by them during the last season. The local board, after coming to the same conclusion reached by your petitioners, seem paralyzed in action, and we call the attention of the State Board to the fact, and respectfully ask its intervention.

Dated HAVANA, N. Y., *February* 5, 1885.

HULL FANTON,
A. O. WHITTEMORE,
A. G. BALL,
F. P. BUTTS,
J. C. DUTCHER.

EXHIBIT "A."

To the Board of Health of the town of Montour, State of New York:

GENTLEMEN — A slaughter-house is maintained by the Messrs. Dibbles in the vicinity of the residences of the undersigned. It is offensive and we believe a cause of danger and an injury to the public health.

Dated *August* 22, 1884.

(Signed)

HULL FANTON,
A. O. WHITTEMORE,
J. C. DUTCHER,
F. P. BUTTS,
A. G. BALL.

EXHIBIT "B."

HAVANA, *February* 4, 1885.

HULL FANTON:

DEAR SIR — I will give you the report of the committee of the whole, given at a board meeting, held September 5, 1884, in regard to the slaughter-house of Dibble Brothers.

The committee of the whole reported that after examining the aforesaid premises, and conferring with the Dibble Brothers, they agreed to remove the said nuisance, and clean the premises, according to the suggestions of the health officer of said board.

Moved, The adoption of the committee's report, and that the health officer see that the suggestions are carried out. Carried.

Adjourned to meet September 13, 1884.

There was no further action taken in the matter by the board.

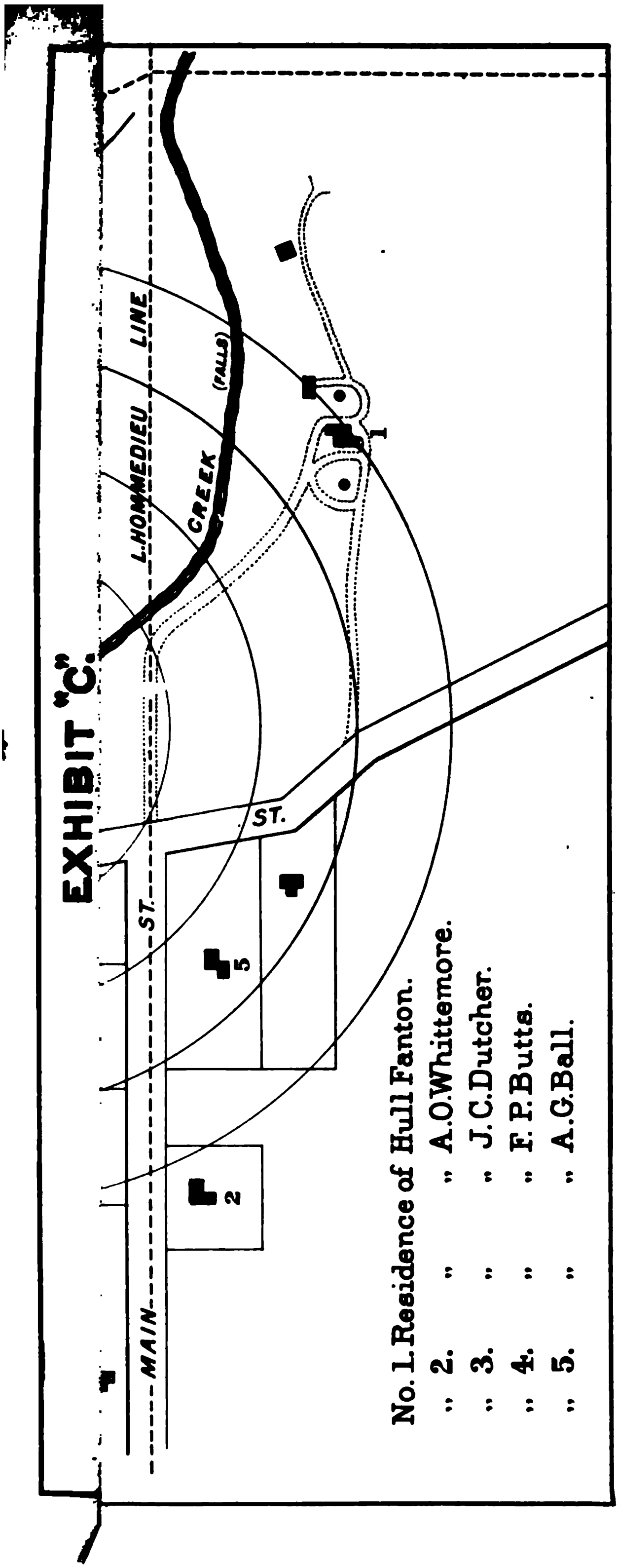
C. M. MARSH,
Secretary.

EXHIBIT "D."

STATE OF NEW YORK, } *ss.*:
County of Schuyler, }

Jerome C. Dutcher, of the village of Havana, in the town of Montour, in said county, being duly sworn, deposes and says that he has been a resident of said village for nineteen years last past; that during the three years last past he has resided in the east part of the village of Havana, on the street known as Broadway, and between said street and the creek known as L'Hommedieu creek; on the map, that has been exhibited to deponent in connection with the "Dibble Brothers' slaughter-house," his place of residence is correctly indicated, at the corner of Broadway and L'Hommedieu streets, and is marked No. 3; deponent is the owner of the vacant land to the south and west of said indicated lot, and is also the owner of the second and third village lots (shown on the map) west of L'Hommedieu street, and on the north side of Main street; on one of these lots he is now engaged in building a dwelling, the foundation of which is now up.

This deponent further says, that previous to the establishment of the slaughter-house mentioned, the water of L'Hommedieu creek was usually clean and wholesome, and his horse and stock drank of it; that after the slaughter-house was fairly under way the water of the creek became so polluted and bad that the horse would not drink of the water at all, and the stock only when compelled by great thirst; that he has tested other horses by having them taken to the creek, and they likewise refused to drink, the same as his own horse; the polluted water, so far as this deponent can discover, has no perceptible bad odor; almost daily, when passing in the vicinity of the slaughter-house named, particularly during the warm season or when a little moist, the offensive odors emanating, as this deponent verily



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believes, from the said slaughter-house are bad and offensive in the extreme.

JEROME C. DUTCHER.

Sworn before me, this 5th day of February, 1885.

A. G. BALL, *Notary Public.*

REPORT OF STATE BOARD.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 25, 1885.

To the Board of Health of Havana, N. Y.:

GENTLEMEN — In response to the complaint by prominent citizens within the village limits and in the immediate neighborhood of the residence, the State Board of Health sent an inspector, Mr. O. S. Wilson, to examine the locality.

Mr. Wilson reports that the slaughter-house is a nuisance to the neighborhood, and that it should be abated. We, therefore, transmit to you the report of Inspector Wilson with the request that the nuisance be abated at an early day.

On behalf of the Board,

ERASTUS BROOKS,
Chairman of Committee on Drainage, Sewerage and Topography.

To the Chairman of the Committee on Drainage, Sewerage and Topography of the New York State Board of Health:

SIR — Acting under instructions from you, I visited Havana May 1st and inspected the slaughter-house owned and operated by the Dibble Brothers, against which complaint was made, and submit the following report:

Said slaughter-house formerly stood about half a mile further north, near the marsh. It was complained of and removed to its present site.

It is situated on low ground and, at present, is not attractive in appearance and is, no doubt, objectionable to people living in the vicinity.

It has not been kept as clean as it should have been, but the owner promises to keep it in better condition if allowed to remain, and claims no objection was made at the time it was moved there.

About three head of cattle and twice as many sheep and swine are slaughtered weekly for the local market. It is within the corporation, contrary to a village ordinance. It is, in my judgment, a matter with which the village authorities are able to deal, and I would respectfully suggest that your honorable Board instruct the local board to see that this, as well as the numerous other nuisances within the corporation referred to in my report of January last and toward remedying which nothing has yet been done, are abated. It would, perhaps, be unfair to single this out for action when so many nui-

sances abound, some of the complainants themselves maintaining nuisances. There is no immediate danger to be feared from this nuisance, but it should be carefully watched by the local health officer, when one is appointed, to see that it is kept in as good sanitary condition as possible.

When the village authorities awake to the necessity of a thorough sanitary inspection and improvement of the village, the ordinance respecting slaughter-houses should also be enforced.

Respectfully submitted,

O. S. WILSON, *C. E.*

May 9, 1885.

REPORT CONCERNING COMPLAINT FROM THE BOARD OF HEALTH OF WELLSBURG, CHEMUNG COUNTY.

To the State Board of Health:

GENTLEMEN — As directed by you and in response to a request from the local board of health of Wellsburg, I have made a personal examination of the house that is the subject of their communication to you, and herewith submit my report as to the conditions discovered by me.

I find the report of the health officer, as to the squalid and filthy condition of the log-house complained of, to be substantiated in every particular, excepting that I could not find any evidence of the accumulation of excremental matter within the house.

Accompanied by the constable, I was admitted to the house by Mrs. Burk, after a little delay, and at once found that the lantern which we had procured was an essential aid to the examination. The interior of the house is divided by rough board partitions into several compartments, the largest of which receives a little light through the grimy panes of a small window and through the crevices between the logs. Heaps of dirt, apparently the accumulations of years, were gathered up in places and entirely prevented us from opening the little-used front door.

An open well, just within the back door, was evidently in constant use, though it cannot fail to receive a certain amount of the filthy washings from the floor, which is very uneven and apparently is formed of boards laid directly upon the earth.

A rough board ceiling, placed over the living rooms of the cabin, is perhaps the most effective roof, as the shingles are off from the roof above in many places, and the whole roof appears about to fall.

An inner room, which serves as kitchen and bed-room, and is perhaps eight by ten feet in size, was in nearly total darkness.

The bedding and all else in this room was in an indescribably filthy condition. The cooking-stove placed close to the bed probably prevents the occupants from suffering with cold in severe weather.

Mrs. Burk seemed incapable or reluctant to make intelligible answers to questions put to her; her singular life of absolute seclusion from light and fresh air and all converse with the inhabitants of the

village will perhaps account for her reticence, though such a life might well be sufficient to unsettle her mind.

The near neighbors of Mrs. Burk testify that they have not seen her for years, the constable with me had never seen her before, and her appearance and peculiar complexion indicated a life of imprisonment in darkness and filth. Whether Mrs. Burk's seclusion is voluntary or not cannot be ascertained from her, but the fact is testified to by her neighbors that she has not been seen out of her home for ten years.

The house was pervaded with a close and sickening smell arising from the filthy floor, the bedding and clothes long unwashed, from various accumulations of rotting vegetables in barrels and the decaying woodwork of the cabin. As far as I was able to understand Mrs. Burk's nearly unintelligible words, she was feeling ill and rheumatic, and would be willing to have her condition improved.

There is no privy attached to the house, and excremental matter is probably thrown out into the yard, where crops are now growing, for no accumulations of such substances were discovered.

While Mrs. Burk remains inclosed in solitude within her dismal abode, Mr. Burk, on the other hand, is said to spend but little of his time at home, and his neighbors certify that the vile smell and the lice which he brings from his filthy cabin into their shops and hotels are exceedingly annoying to them.

The annexed sketch shows that the log-house stands directly upon Front street, the main street of the village, and is surrounded with others of a far better class.

It is the testimony of the near residents that, in suitable conditions of the atmosphere, the sickening odors from the house are plainly evident to passers-by.

It would seem that the circumstances will justify the declaration that the house in question is a public nuisance in its present condition, and that it should no longer be tolerated as it is. The opinion of Mr. J. D. Hammond that the building is not worth repairing is amply justified, and it would seem, moreover, that only prolonged exposure to the action of air and sunshine can ever rid it of its accumulations of vileness.

It would be advisable to burn a sufficient quantity of sulphur within the house to destroy vermin concealed in its crevices, after first stopping up the holes as well as possible. This process should be repeated after a few days, in order to exterminate such insects as may hatch out after the first smoking. All articles of bedding and wearing apparel now within the house should share in the fumigation.

After the destruction of the vermin, which would otherwise invade the neighborhood, the owner's cheapest and best method of cleansing the premises would consist in the entire removal of the cabin, which is no longer a fit habitation for human beings.

Very respectfully yours,

HORACE ANDREWS.

ALBANY, *August* 10, 1885.

SECRETARY'S RETURN.

ALBANY, *August* 13, 1885.

ABNER C. WRIGHT, Esq., *Secretary Board of Health, Wellsburg, N. Y.:*

DEAR SIR — I transmit herewith a copy of a report by Inspector Horace Andrews, C. E., on the condition of the premises occupied by Burk and his wife, referred to in a previous communication from your board. In view of the facts stated by Mr. Andrews and of the close proximity of the hovel in question to neighboring habitations, I am of opinion that it clearly falls within the category of nuisances which sanitary authorities should order to be abated.

If the danger to health arose solely from accumulations of filth created by the tenants themselves, they could be compelled to remove these and to observe such rules of sanitary cleanliness as your board should prescribe; but if, as seems to be the case, insanitary conditions be inherent in the building itself, the owner, not the tenant, is responsible for these and should be ordered to abate them. In the present instance it is stated that no repairs or alterations can remedy the essential defects in the structure or render it fit for human habitation; if so, the owner can be directed to remove it altogether, in which case the eviction of the tenant would be a necessary part of the procedure, and the fumigation of the premises could be substituted by their destruction.

Wherever such a tenant may live, he is likely to create a nuisance and should be compelled to obey sanitary regulations.

I am, sir, faithfully yours,

ALFRED LUDLOW CARROLL, M. D.

COLD SPRING PUMP

Complaint.

WEEDSPORT, *November* 12, 1884.

To the Board of Health of the State of New York:

Herewith please find petition to board of health of town of Brutus and the action thereon in which the needful facts are stated and set forth, except as to efforts heretofore made, to have the evil remedied. These are that application has been made to the section canal superintendent and other canal officers to have a remedy applied by lowering the culvert under the bridge approach and, though its necessity has been admitted and promised at different times, fails of being applied, and, therefore, the action of your Board and its authority is respectfully invoked that the declared nuisance may be abated and its cause remedied, and your petitioners will ever pray.

In behalf of petitioners, respectfully submitted,

WILLIAM I. CORNWELL.

To the Board of Health of the town of Brutus:

The undersigned, citizens and residents of said town, respectfully represent that a public nuisance exists upon lot No. 57, in said town, prejudicial to health, caused by an embankment and approach to a bridge spanning the Erie canal at Cold Spring pump, and an insufficient culvert to permit the flowing off of water falling upon the surface of several hundred acres of land, and which accumulates upon some eight to twelve acres lying westerly from said embankment and southerly from and adjoining to the canal, where it remains, stagnates and saturates the land until evaporated, producing malaria, causing sickness and converting what would otherwise be good cultivatable land into a flag-hole of several acres, and which can be effectually remedied and abated by lowering the culvert in or under the bridge approach and the ditch leading to the culvert under the canal. Therefore, the exercise of your authority is invoked that the remedy may be applied, and your petitioners will ever pray, etc.

Dated *August* 1, 1884.

ELIJAH S. DRAKE,
JAMES E. CARR, M. D.,
HILAND A. WEED, M. D.
JOHN PERRY,
E. H. BATES,
JOHN G. BRADT,
CARLOMAN COPP,
WILLIAM D. ABBOTT,
I. T. MEECH,
GEORGE W. COLE,
F. L. DINGMAN,
G. E. TOWNSEND,
G. W. GARLAND,
A. W. ABBOTT,
E. O. BONTA,
W. W. ROCHE,
CHAS. E. ROBILLARD,
CHARLES P. DATTEN,
THOMAS C. WARD,
O. N. EVERTS,
WILLIAM. M. BRADLEY.

To the Board of Health of the town of Brutus:

The undersigned, health officer of said town, respectfully reports that he has examined the premises specified in the annexed petition, and inquired into the matter stated therein, and finds the facts relative to said premises, their location, accumulation and standing of water thereon, and causing a marshy flag-hole of several acres to be, as stated in said petition, and the same is undoubtedly productive of malaria, likely to affect the health of citizens in its vicinity, as it is certified to have done by Messrs. Carr and Weed, physicians prac-

ticing in that neighborhood; that he also finds that, while the State constructed a ditch and a culvert under the canal bridge approach to carry off the surface waters that must necessarily accumulate on said premises, their flow being obstructed by the embankment of the Erie canal, as well as those leading from the canal, the culvert under the bridge approach is at an elevation that does not permit of their being carried off, and that the *lowering* of that culvert would be an *efficient* and the *only* remedy for what is now a public nuisance, there being a culvert under the canal, a short distance east of the bridge, ample for carrying off the water.

Respectfully submitted,

E. O. BENEDICT,

November 6, 1884. *Health Officer, town of Brutus.*

At a meeting of the board of health of the town of Brutus, held at the office of D. C. Knapp, in the village of Weedsport, on the 6th day of November, 1884: Present, Levi T. Hamilton, supervisor; Francis L. Batchelor, Darwin C. Knapp, Milton Reede and Dwight Cady, justices, and David W. Shaw, town clerk. Health officer E. C. Benedict made a report as to the matters contained in the petitions of Elijah S. Drake, James E. Carr, M. D., Hiland A. Weed, M. D., and others, which had been theretofore referred to said health officer for investigation, whereupon, on motion of Mr. Batchelor,

Resolved, That the matter complained of in said petition, and specified therein, and in the report of said health officer, is a public nuisance.

I hereby certify the foregoing to be true copies of the originals on file in this office, and of the whole thereof.

DAVID W. SHAW,

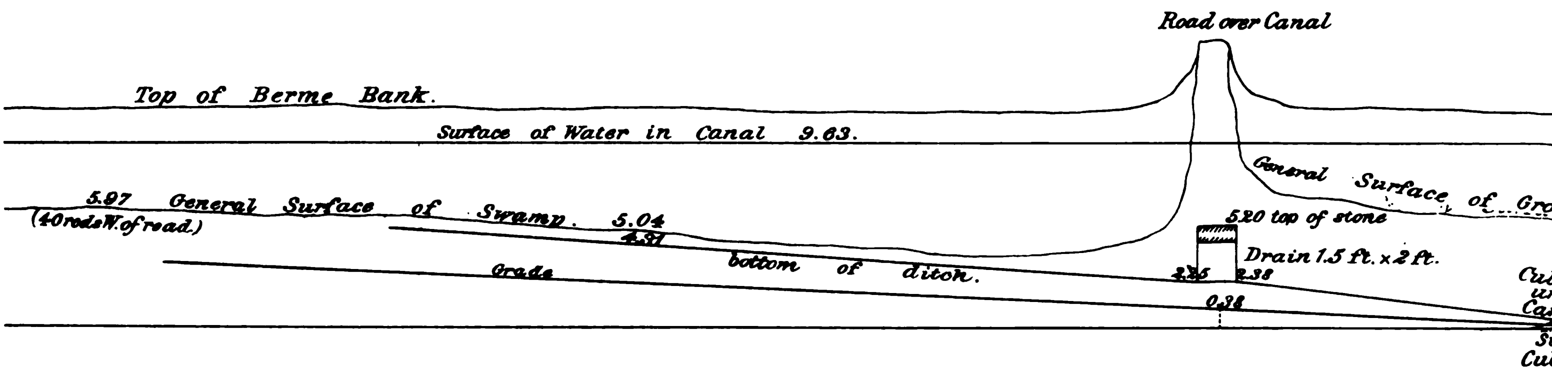
Town Clerk of Brutus, N. Y.

REPORT UPON A NUISANCE CAUSED BY SWAMP LANDS AT COLD SPRING PUMP, TOWNSHIP OF BRUTUS, CAYUGA COUNTY.

JAMES T. GARDINER, Esq., *Chairman of the Committee on Drainage, Sewerage and Topography:*

SIR — I have recently examined into the causes of complaint made in a petition from certain residents of the township of Brutus, Cayuga county, and have taken levels to ascertain whether the means of relief suggested in the petition were practicable. My report concerning the facts ascertained is herewith submitted. The accompanying sketch shows the general location of the swampy lands mentioned in the petition. The surface of the land immediately south of the Erie canal and lying just west of the dividing line between Cayuga and Onondaga counties is quite flat, and the natural drainage is to the northward.

The surface of the water in the Erie canal is three or four feet higher than the land to the south, and the natural drainage of the



Approximate Section along the South side of the Erie Canal at Cold Spring Pump.

country in the vicinity of Cold Spring pump is carried under the canal by a substantial and effective culvert, lying a few rods west of the county line. There is a piece of low and swampy land lying between the canal and the first road to the south of it, and between the first and second roads west of the county line, as shown on the sketch, which receives the drainage from a water-shed estimated at 400 acres. The area of the swamp is from eight to twelve acres, and it is for the most part quite wet, being covered with cat-tails and sedge-grass at places, and, to some extent, with trees.

The only means of draining the swamp referred to is a ditch flowing to the eastward, parallel to the berme bank of the canal, and passing under the north and south road at Cold Spring pump, through a drain eighteen inches wide and twenty-four inches deep. This ditch flows under the canal through the culvert before referred to, about 300 yards east of the road.

It is claimed by the inhabitants residing in the vicinity of the swamp that numerous cases of sickness have been caused by its malarious influences, and the physicians of the neighborhood are willing to make affidavit to the fact. The further claim is made that the State, by constructing the canal, has obstructed the natural drainage, and that the culvert provided under the road to the east of the swamp is improperly constructed, and cannot give means for the drainage of the swamp.

In order to verify the latter claim, I have taken levels which indicate upon the accompanying profile the relative height of the land and road culvert. It is seen that the ditch west of the road is very shallow, and that it cannot be deepened sufficiently to drain the adjoining land unless the drain passing under the road is placed at a lower level. Moreover, the drain under the road is of too small size to allow the surface drainage from so extensive a water-shed to escape freely; it is in fact adapted to receive the canal leakage and not much beside. It would seem as if the drain under the roadway had been constructed without due consideration of the extent of territory which must drain through it.

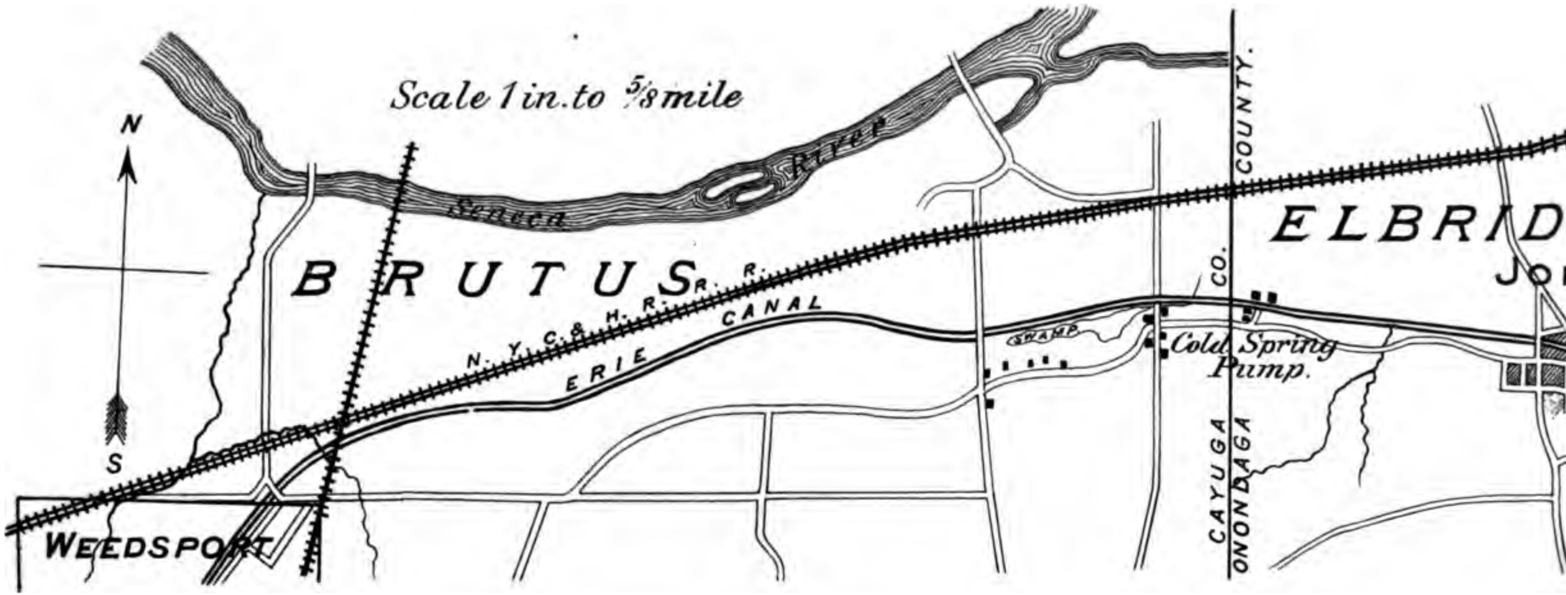
Under the circumstances it would seem that the State would be amply justified in enlarging and deepening the culvert under the roadway, and in clearing out and deepening the ditch at the foot of the berme bank. I would recommend that the bottom of the drain be lowered two feet below its present level, and that the drain be made at least two feet wide and three and a half feet deep. The ditch could then be dug to a depth of two feet to three feet and, with the lateral drains which the inhabitants agree to dig, the swamp could easily be reclaimed and placed in a good sanitary condition. Further to the west, along the canal, land that was originally swampy is now drained and is arable. The swamp complained of is stated to be in a much worse condition than before the canal was constructed, and the natural drainage prevented. As the swamp has been covered with trees till within a few years, no attempts have ever been made to cultivate the land.

The expenditure required to make the improvements suggested would be slight, and it would appear as if the State was in equity bound to furnish the inhabitants with the relief for which they have petitioned.

Very respectfully yours,

HORACE ANDREWS, JR., C. E.

ALBANY, *December* 4, 1884.



Scale 1 in. to 5/8 mile
N
S
Seneca River
BRUTUS
N. Y. C. & H. R. R. R.
ERIE CANAL
SWAMP
Cold Spring Pump.
CAYUGA CO.
ONONDAGA COUNTY.
ELBRID
JOR
WEEDSPORT

FOOD AND DRUG AND BEER LAWS.

REPORT

OF WILLIS G. TUCKER, M. D., Ph. D.,

ANALYST OF DRUGS.

To Woolsey Johnson, M. D., *Chairman of the Sanitary Committee of the State Board of Health of New York:*

Sir — At a conference of the analysts, with the members of the Sanitary Committee, held in Rochester, July 30, 1885, the examination of drugs and medicinal substances generally, but more particularly of the officinal drugs and preparations of the United States Pharmacopœia, exclusive of the vegetable alkaloids and those preparations into which they enter, was assigned to me. The collection and examination of samples was begun September 1st, and I transmit herewith a report on the work done from that date to the present time. It was agreed that the analysts should engage their own collectors and, with the exception of a few samples purchased by myself, the articles examined by me have been collected under my direction by my assistant, Mr. A. G. Losee. The total number of samples collected and examined was 194, and the average cost of these samples, including collector's *per diem* and expenses, was a fraction over twenty-two cents.

In the selection of articles for examination, rarely used and unimportant drugs were excluded, and regard was had to the results previously obtained by analysts in this and other States, those articles most likely to be purposely adulterated, of inferior quality or impaired by age, being selected, that no time might be wasted in the examination of articles seldom prescribed or almost invariably pure. Preference was given to such articles as have a definite standard of purity assigned to them in the United States Pharmacopœia, since that work is particularly recognized in the Food and Drug Adulteration Law of 1881, and the pharmacopœial tests and analytical processes were commonly followed. Exhaustive analyses were not generally made, since they would have consumed much time to little profit, and limited the number of samples examined, but in the majority of instances at least one quantitative determination was necessarily made. All samples examined have been bottled and fully labeled, and the portion remaining upon the completion of the analysis has been preserved and full records of the same kept. Reports have been made to the Secretary of the Board, at the close of each month, upon the work done during the preceding month, and these have been accompanied with separate reports upon each sample examined.

Of the 194 samples examined 120 were of officinal drugs and preparations, and 74 of vinegar, which, although it has been dismissed from the United States Pharmacopœia at the last revision (1880), is still retained in those of most other countries. Vinegar, therefore, although generally classed with foods, may yet be considered a drug, and it having moreover been agreed that the analysts should not necessarily be restricted to the fields assigned them, and it being deemed advisable, for various reasons, to begin an investigation as to the quality of the vinegar sold in this part of the State, a number of samples were collected and examined, and it is proposed to continue this investigation by the collection of further samples in other localities.

I. DRUGS.

Of the 120 samples of drugs examined, 50 were procured in Albany, 27 in Troy, 20 in Hudson, 12 in Schenectady, and 11 in Amsterdam. With the exception of 12 samples of cream of tartar purchased at groceries they were all obtained at drug stores. Of the total number there were rated as of

Good quality	59 or 49.2 per cent.
Fair quality	35 or 29.2 per cent.
Inferior quality	23 or 19.1 per cent.
Sold by error	3 or 2.5 per cent.

Those classed as of "good quality" practically conformed to the requirements of the United States Pharmacopœia; those of "fair quality" fell not far below those requirements, while those rated as "inferior" were entirely fictitious (as in the case of some of the cream of tartars) or of very poor quality. In three cases the article sold did not consist of the substance called for.

The following were the articles examined:

Citric Acid. (*Acidum Citricum*, U. S. P.)

Three samples examined. Nos. 1, 4 and 11. Percentage purit respectively 99.73, 99.76, and 97.91. All of fair quality, containin traces only of metallic impurities.

Tartaric Acid. (*Acidum Tartaricum*, U. S. P.)

Four samples. Nos. 2, 10 and 59 of fair quality, containing trac of metallic impurities. Percentage purity respectively 97.82, 99.6 and 98.00. No. 3 consisted of *cream of tartar* of good quality doubtless sold by mistake.

Iodide of Potassium. (*Potassii Iodidum*, U. S. P.)

Three samples, of which Nos. 5 and 8 were of fair, and No. 65 o good quality.

Bromide of Potassium. (*Potassii Bromidum*, U. S. P.)

Three samples, of which Nos. 6 and 7 were of fair, and No. 66 o good quality.

Santonin. (*Santoninum*, U. S. P.)

One sample, No. 9, which was of good quality.

Cream of Tartar. (*Potassii Bitartras*, U. S. P.)

Twenty-two samples, of which 10 were purchased at drug stores and 12 at groceries. Of the former *all* were real cream of tartar, 9 being of good, and 1 of fair quality. The percentage purity of these samples was as follows:

No. 12	87.19
No. 13	97.70
No. 14	94.92
No. 15	97.43
No. 16	97.80
No. 17	97.78
No. 48	97.67
No. 49	95.63
No. 50	98.73
No. 69	97.58

Average purity, 96.24 per cent.

Some of the commercial cream of tartar now sold is of an extraordinary degree of purity, there having been a great improvement in this respect during the last few years.

Of the 12 samples purchased at grocery stores, 2 were of good, 1 of fair, and 1 of inferior quality, while 8 were grossly adulterated or entirely fictitious. The percentage purity of the four first named was as follows:

No. 19	92.26
No. 20	81.47
No. 54	96.87
No. 56	79.31

Average of these four samples of real cream of tartar, 87.48 per cent, being much below that of the preceding samples obtained from drug stores. The remaining eight were made up as follows: Nos. 18, 21, 22 and 51 consisted chiefly of acid phosphate of lime and starch; No. 23 of sulphate of lime, starch and some cream of tartar, the acidity corresponding to 13.24 per cent; Nos. 52 and 53 consisted chiefly of sulphate of lime, starch and tartaric acid, the acidity of these samples corresponding to 31.57 and 30.56 per cent of cream of tartar, and No. 55, which was mainly sulphate of lime with some tartaric acid, with an acidity corresponding to 19.20 per cent.

The number of samples examined is too small and the territory in which they were collected too limited to base conclusions of much value upon the results obtained, though it would appear that a pure article is much more likely to be sold by the druggist than the grocer, whose so-called cream of tartar is often a mere imitation, and a very poor one at that.

Alcohol. (*Alcohol*, U. S. P.)

Six samples, Nos. 24, 25, 26, 27, 28 and 29; all were of good quality. The U. S. P. requires "91 per cent by weight of ethyl-alcohol." The percentage in these samples was respectively 91.14, 90.12, 90.16, 90.37, 90.30 and 90.87. Average, 90.49 per cent.

Stronger Ether. (*Aether Fortior*, U. S. P.)

Twelve samples, of which Nos. 31 and 32 were deficient in strength; Nos. 30, 104 and 117 were of inferior strength and quality; Nos. 111 and 114 were of fair quality, and Nos. 57, 99, 102, 106 and 120 were of good quality. No. 99 was labeled "Nitrous Ether" by mistake. Stronger ether, being largely used as an anæsthetic, ought to be of good quality, but these results show that an article of a quality inferior to that required by the pharmacopœia, is frequently offered for sale. The U. S. P. requires a specific gravity "not higher than 0.725 at 15 deg. C. (59 deg. F.)." The specific gravities of the twelve samples examined were as follows:

No. 30	0.737
No. 31	0.752
No. 32	0.739
No. 57	0.726
No. 99	0.724
No. 102	0.725
No. 104	0.744
No. 106	0.726
No. 111	0.724
No. 114	0.721
No. 117	0.747
No. 120	0.724

Purified Chloroform. (*Chloroformum Purificatum*, U. S. P.)

Twelve samples, of which Nos. 33 and 35 were of inferior quality and strength; No. 113 of fair quality, and Nos. 34, 58, 98, 101, 103, 105, 110, 116 and 119 were of good quality. The U. S. P. requires a specific gravity of 1.485–1.490 at 15 deg. C. (59 deg. F.) The specific gravities of the twelve samples examined were as follows:

No. 33	1.456
No. 34	1.488
No. 35	1.450
No. 58	1.493
No. 98	1.490
No. 101	1.489
No. 103	1.488
No. 105	1.488
No. 110	1.488

No. 113	1.487
No. 116	1.488
No. 119	1.489

Carbonate of Ammonium. (*Ammonii Carbonas*, U. S. P.)

Ten samples; of which Nos. 36, 115 and 118 were of good quality; No. 112 of fair quality, and Nos. 37, 38, 100, 107, 108 and 109 were of inferior quality, having undergone partial decomposition. In order to preserve this important medicinal agent in good condition it should be kept in well-stopped bottles and in a cool place. The results of the analyses made show that it is often carelessly kept and partly decomposed in consequence when offered for sale. The percentage purity of the ten samples was as follows:

No. 36	92.66
No. 37	66.44
No. 38	83.03
No. 100	65.91
No. 107	69.44
No. 108	67.87
No. 109	67.59
No. 112	79.68
No. 115	95.10
No. 118	96 95

Average of the ten samples, 78.46 per cent.

Chlorate of Potassium. (*Potassii Chloras*, U. S. P.)

Five samples, Nos. 39, 40, 41, 60 and 61, all of good quality.

Reduced Iron. (*Ferrum Reductum*, U. S. P.)

Six samples were examined, none of which came up to the pharmacopœial standard, which requires 80 per cent of metallic iron, but with the exception of No. 42 which consisted of *dried sulphate of iron*, sold through ignorance; the remaining samples, Nos. 43, 44, 62, 63 and 64 were considered of fair quality.

Gallic Acid. (*Acidum Gallicum*, U. S. P.)

Four samples, Nos. 45, 46, 47 and 68, all of good quality.

Dried Sulphate of Iron. (*Ferri Sulphas Exsiccatus*, U. S. P.)

One sample, No. 67, which was of good quality.

Water of Ammonia. (*Aqua Ammoniæ*, U. S. P.)

Five samples; Nos. 72 and 73 were of fair, and Nos. 70, 71 and 91 of good quality, though most of them contained slight traces of metallic impurities, sulphates, etc. The U. S. P. requires

"ten per cent by weight of the gas." The percentage in the five samples examined was as follows:

No. 70	10.8
No. 71	15.5
No. 72	8.3
No. 73	7.8
No. 91	11.0

Benzoic Acid. (*Acidum Benzoicum*, U. S. P.)

Three samples, of which Nos. 74 and 95 were of good, and No. 75 of fair quality.

Oxalate of Cerium. (*Cerii Oxalas*, U. S. P.)

Four samples, Nos. 76, 77, 90 and 97, all of a fair degree of purity, though none of them corresponded precisely with the requirements of the U. S. P.

Magnesia. (*Magnesia*, U. S. P.)

Four samples, of which No. 92 was of good quality, Nos. 78, 79 and 80 only fair. This article is generally carelessly kept, and therefore partially carbonated by exposure to the air. It should be kept in well-closed vessels.

Washed Sulphur. (*Sulphur Lotum*, U. S. P.)

Four samples; Nos. 81 and 93 were of good quality, No. 82 consisted of *precipitated sulphur* sold by error, and No. 83 was *sublimed sulphur* or common "flowers of sulphur." The pharmacopœial requirements are plain, and there is no excuse for the sale of an unpurified article or other preparation of sulphur.

Oxide of Zinc. (*Zinci Oxidum*, U. S. P.)

Four samples, Nos. 84, 85, 86 and 94, all of fair quality.

Iodoform. (*Iodoformum*, U. S. P.)

Four samples, Nos. 87, 88, 89 and 96, all of good quality.

II. VINEGAR.

The seventy-four samples examined were all purchased at grocery stores, cider vinegar being called for in each instance. At a meeting of the Board held January 16, 1883, a standard was adopted for cider vinegar under and pursuant to section 4 of chapter 407 of the Laws of 1881, which standard was "not less than five (5) per cent of pure acetic acid" and "not less than one and one-half per cent of solid matters" on evaporation and drying at 212 deg. F. The Massachusetts Law of 1882 required the same percentages in the case of *all* vinegars, but in 1885 was amended and now requires "not less than four and one-half per cent by weight of absolute

acetic acid" in *all* vinegars and "not less than two (2) per cent of cider vinegar solids" in *cider* vinegar, and it prohibits the sale not only of adulterated or weak vinegar, but of any vinegar for cider vinegar which is not made exclusively from apple cider, and likewise the use of any artificial coloring matter. This is a good law, for while vinegar made from spirits or otherwise may be equally wholesome, it ought not to be sold for cider vinegar, as is very frequently the case.

An article so largely used in the preparation of food as vinegar ought to be both free from adulteration and of good strength as well, but the results of the examinations so far made show that here as elsewhere wide differences in quality exist. The addition of mineral acids is very uncommon, but much vinegar is sold which has been plentifully watered, and the greater part of that sold as cider vinegar is a so-called white wine vinegar colored by caramel with perhaps some cider vinegar added to give it flavor.

Of the seventy-four samples of vinegar examined, thirty-five were purchased in Albany, nineteen in Troy, six in West Troy, four in Green Island and ten in Cohoes. Of the total number, eleven or 14.8 per cent, were found to contain five per cent or over of absolute acetic acid, and sixty-three, or 85.2 per cent, contained less than five per cent and therefore fell below the legal requirement; eighteen, or 24.3 per cent, contained 4 1-2 per cent or over, and 56, or 75.7 per cent contained less than 4 1-2 per cent. The highest percentage of absolute acetic acid was 6.2 per cent and the lowest 1.8 per cent, the average being 4 per cent.

Number.	Per cent Acetic Acid.	Number.	Per cent Acetic Acid.
121	4.1	142	2.9
122	6.2	143	4.4
123	4.0	144	4.6
124	4.1	145	4.3
125	4.8	146	3.3
126	3.5	147	3.2
127	3.4	148	4.0
128	5.2	149	3.9
129	4.1	150	5.2
130	3.3	151	4.3
131	5.5	152	5.0
132	4.3	153	4.4
133	3.5	154	4.2
134	3.8	155	3.0
135	2.3	156	3.8
136	4.2	157	2.9
137	4.7	158	5.0
138	4.9	159	4.2
139	5.0	160	4.2
140	3.8	161	5.0
141	3.6	162	4.3

Number.	Per cent Acetic Acid.	Number.	Per cent Acetic Acid.
163	3.6	179	3.4
164	3.6	180	4.3
165	3.9	181	4.5
166	5 4	182	4.1
167	4.2	183	2.7
168	3.7	184	3.5
169	3.9	185	3.8
170	4.3	186	5.5
171	5.0	187	3.4
172	4.9	188	2.8
173	4.4	189	3.2
174	2.4	190	3.3
175	2.5	191	3.5
176	3.5	192	3.6
177	3.7	193	4.5
178	1.8	194	4.4

Other analyses made for the Board have been as follows:

WATER.

Four samples. One of these was from a city well, and furnished so striking an example of drinking water contaminated by excrementitious matter, probably serving as the medium of disease transmission, that the report made at the time is appended.

ALBANY, *September* 10, 1885.

Dr. A. L. CARROLL, *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR — I have made an analysis of a sample of well water from premises No. 308 Third street, Albany, sent to me September 5, 1885, by Dr. B. U. Steenberg of Albany, by request of Mr. Carman. The results point to gross contamination of the water. A death from diphtheria occurred in this house very recently and three other deaths from the same disease are known to have occurred in the immediate vicinity within a short time. I visited the premises on the 5th inst., with Dr. Steenberg and found the well, said to be thirteen feet deep, dug in a sandy soil and situated directly in the rear of the house. A privy with vault said to be eight feet deep and full to the surface of the ground, was situated about seventy feet from the well. A drain pipe from the second story of the next house on the east discharged within a few feet of the well upon the surface of the ground, the slop water, etc., from the same flowing back upon the lot and soaking into the ground. The condition of things described as existing upon these premises is essentially the same in all others in this neighborhood. There is no drain in the street, as I am informed, west of Thornton street and no water mains laid. Foul privies abound on all sides, and the water supply is drawn

from shallow wells dug in sand, in some cases within a *few feet* of the privies. Much drainage is discharged upon the surface of the ground, and as there are no pavements in this immediate locality it soaks into the sandy soil. Such a condition of things is in the highest degree insanitary, and it is certainly not surprising if diphtheria, typhoid fever and other infectious diseases are of frequent occurrence, as is said to be the case.

Analysis.

Color and appearance	Clear, Colorless.
Odor at 100 degrees F........................	None.
Chlorine, grains per U. S. gallon	13.42
Free ammonia, parts per million........................	6.400
Albuminoid ammonia, parts per million................	0.340
Total solids, grains per U. S. gallon	88.72
Loss on ignition, grains per U. S. gallon	43 78
Mineral matter, grains per U. S. gallon	44.94

Very respectfully yours,
WILLIS G. TUCKER.

Samples of water from Kingston (city water supply) and from Oneida lake (two analyses) were also analyzed. The former were reported October 9, and the latter November 10, 1885.

KEROSENE.

Six samples have been submitted for examination with the following results:

Flashing point.	Degrees F.
No. 8686..	100
No. 8687..	100
No. 8688..	100
No. 8689..	100
No. 8690..	99
No. 8691..	100

All of which is respectfully submitted.

WILLIS G. TUCKER,
Analyst.

CHEMICAL LABORATORY, ALBANY MEDICAL COLLEGE, ALBANY, N. Y., *February* 22, 1886.

REPORT

OF G. C. CALDWELL, Ph. D.,

ANALYST OF ALKALOIDAL MEDICINAL PREPARATIONS.

Chemical Laboratory, Cornell University,
February 10, 1886.

To the Secretary of the State Board of Health:

Dear Sir — I beg to submit the following report of work thus far accomplished in the examination of alkaloidal medicinal preparations. The work was begun September 1, 1885.

The assay of quinine pills.— No method of assay of this preparation is given in the Pharmacopœia.

The determination of the total quantity of alkaloid in the pills may be made in two ways, both of which depend upon the liberation of the quinia from the acid by a stronger base, the extraction of this alkaloid by ether, the expulsion of the ether from the solution thus obtained, and the drying and weighing of the residue. As this residue may contain other alkaloids besides quinia, the pharmacopœial test of purity must be applied to it before the assay can be regarded as completed.

These two methods of determining the total alkaloid in the pills differ only in respect to the treatment for the liberation of the quinia from the acid, and the mode of extracting the quinia by ether. By one method, described by Allen for the assay of quinine preparations generally, the solution of the substance in acidified water is treated with ammonia, and the precipitated quinia is then taken up by ether. By the other method first described by Parsons, the pills are softened with a small quantity of water, freshly slacked lime is added, the mixture is dried, pulverized, transferred to a continuous extractor and treated with the ether for several hours.

The manipulation of the first method is much easier and more satisfactory; but Mr. Parsons claimed for the second method a greater degree of accuracy; after the mixture of substance and lime is once safely transferred to the extractor, it is probable that the manner of making the ether extract will generally yield a purer solution of alkaloid; for nothing but pure, stronger ether comes in contact with a mass supposed to contain nothing soluble in such ether except alkaloids. In the case of the other method, ether saturated with water is agitated with an aqueous, ammoniacal solution of so much of the pill as is soluble in water, and opportunity is thus afforded for the solution of other matters besides alkaloids; but the range of solvent power of ether saturated with water is probably

but little greater than of pure ether. I am not aware how far the difference between the two has been carefully tested, so far as it bears on the point under discussion. I hope to be able soon to make such tests myself.

The pulverizing of the dried mixture of lime and pill substance must, of course, be very complete, in order that no particles of the quinia shall be mechanically inclosed in the large mass of substance that is entirely insoluble in the ether, and is thus quite capable of protecting such inclosed quinia from solution. I have found this pulverization very tedious; and the transferring of this fine, dry and sometimes rather adhesive powder from a mortar to the extractor is not the kind of an operation that a chemist likes to perform in quantitative work. Other and more serious objections to the method were brought out in my very brief experience with it.

Those who are familiar with the continuous ether extractor are aware that a tolerably rapid percolation of the ether through the mass to be extracted is essential. In the case of the second sample of pills that I attempted to assay by this method, the powdered contents of the extractor were, for some reason, converted on contact with the ether into a hard and perfectly impervious mass, on which the ether stood for twenty-four hours without the passage of a drop through it. Of course the assay was an entire failure. The fourth sample of pills, of which an assay was also attempted by this method, behaved in precisely the same manner. I had taken it from my numbered collection without noticing the name of the maker; it proved to be the same that had given me trouble in the first instance. Such a result, after having carefully executed the most tedious part of the work, is discouraging, to say the least, even if it may not often occur.

The second objection to the method affects its accuracy, and might not have been brought to light if I had not at the same time checked this method by the other. On preparing the solution of another sample of pills (No. 19) for the other method, it appeared that they contained a notable quantity of a fatty substance, which by the dry method would be extracted and weighed as quinia; by the solution method, as I conduct it, this fat is at once detected and removed, with other insoluble matters by filtration, before the liberation of the quinia and its solution in ether. These two-grain pills, assayed by the dry method, gave a result corresponding very closely to the two grains of crystallized sulphate of quinia per pill; but, assayed by the solution method, which, in this case, would unquestionably give a more reliable result, it corresponded to but one and three-quarters grains to the pill.

The degree of accuracy of the solution method was tested by the assay of a solution, containing a known quantity of a reliable brand of sulphate of quinia, together with the usual proportions of other ingredients commonly used in the preparation of the pills, such as glucose, gum-arabic and gelatine; several weighed portions of such a solution were subjected to analysis. It being stated that some glucose may be dissolved by the ether in this operation, and thus a

too high result obtained, the residue of quinia by the first precipitation and extraction was dissolved by dilute sulphuric acid, and the quinia was again precipitated by ammonia, and taken up by ether. The results are given in per cents of the quality of quinia that should have been obtained if the process were perfect.

Assay Number.	Per cent.
1	100.00
2	98.01
3	99.42
4	97.80

Average, 98.8 per cent.

Four samples of pills have thus far been assayed by this method, and also partly by the dry methed. The manner of conducting the solution method is essentially the same as described by me in a former report to this Board,* except that, instead of dissolving a small number of the pills in the graduated tubes in which the assay is made, a filtered solution of a larger number of pills, representing from fifty to seventy-five grains of the sulphate, is prepared, and two or more parts of the solution, carefully weighed, are subjected to the assay.

The results of the examination of these four samples are given in the following table, calculated to grains per hundred pills of sulphate of quinia, with seven molecules of water of crystallization, which, according to Parsons, is all the water that need be allowed. Stronger ether was used in all cases.

No. of Sample.	Put up by	Where purchased.	Sulphate of Quinine, Formed. (Grains per pill.)			
			Dry method.		Solution method	
18	McKesson & Robbins.	Ithaca...........	192	197	194	194
19	Tilden & Co..........	Ithaca....	206	....	179	172
20	Otis Bros............	Binghamton	....	....	228	231
22	Keasby & Mattison....,	Binghamton	....	....	92.8	92

The discrepancy in the results by the two methods in the case of sample 19 is explained above; the second result by the solution method is not, in this case, obtained by the assay of a second portion of the solution, but by solution, re-precipitation and re-solution by ether of the product of the first assay; in the other cases the two results represent assays of two separate portions of the same solution. Samples 18, 19 and 20 were two-grain pills; sample 22, one-grain.

The tests of the purity of the alkaloid obtained in these assays yet remain to be made.

Assay of Citrate of Iron and Quinine.

The assay of this preparation was conducted in the same manner as in the case of the pills, except that, as the citrate dissolves more or less readily to a clear liquid, the solution of a weighed quantity

*Second Annual Report of the State Board of Health of New York, p. 697.

was made directly in the assay tube. The Pharmacopœia prescribes for the assay the use of potash as a precipitant of the alkaloid, in the presence of tartaric acid, and chloroform as the solvent of the alkaloid. By the use of ammonia and stronger ether instead of potash and chloroform, the residue of quinine obtained appears to be purer, because less colored, the necessity of using tartaric acid is avoided, and the manipulation is more convenient.

The following tests of the accuracy of the method were made with weighed portions of a solution containing citrate of iron and ammonia and a known quantity of sulphate of quinia; the results are given in per cent of the quantity that should have been obtained if the method were perfect.

Number.	Per cent.	Number.	Per cent.
1	98.64	7	99.15
2	100.02	8	99.01
3	100.04	9	101.30
4	99.07	10	101.10
5	99.05	11	101.10
6	98.93		

In the case of the last three results, the ether was very vigorously shaken up with the aqueous liquid in the tube, while in the other cases the agitation was more gentle, but was continued as long as any undissolved particles of quinia were visible. In my assays of samples of the citrate the method of moderate agitation was followed.

The results above given appear to justify my dependence on the ammonia-ether method of assay as trustworthy.

The U. S. Pharmacopœia of 1880 states that the citrate of iron and quinine should yield a quantity of quinia, when assayed by the method there described, equivalent to twelve per cent of the original citrate. The results of my duplicated examinations of this preparation are given below.

No. of sample.	Said to be put up by —	Where purchased.	Per cent of quinia found.		
1	McKesson & Robbins	Ithaca	8.93	8.99	
2	Powers & Wightman	Ithaca	9.66	9.70	
3	Charles T. White & Co	Ithaca	9.36	9.06	
4	Rosengarten & Sons	Ithaca	11.54	11.75	
5	C. W. Holmes	Elmira	7.08	7.17	
6	McIntyre & Embury	Elmira	10.48	10.88	
7	Unknown	Elmira	9.16	9.24	
8	McKesson & Robbins	Elmira	10.13	10.07	
9	Fraser & Lea	Ithaca	4.09	4.02	
10	Billings, Clapp & Co	Syracuse	8.36	8.41	
10	(Re-examination)	....	8.40	8.42	
11	Hall & Rückel	Syracuse	7.75	7.83	
11	(Re-examination)	....	7.79	7.75	
12	Mellinckrodt Chemical Works	Syracuse	10.72	....	
14	Tarrant & Co	Owego	11.10	11.12	11.07
15	E. R. Squibb	Binghamton	10.63	10.71	
16	Sharp & Dohme	Binghamton	9.14	9.43	
17	Schieffelin & Co.	Binghamton	10.48	9.31	
21	Charles Pfizer	Binghamton	5.85	5.87	

Inspection of the table shows that the quality of the citrat quite variable, and that in some cases it falls so far below the st ard that its medicinal effect cannot but be notably affected.

In the last report of the Massachusetts Board of Health, Lu and Charity the results of the examination of fifteen sample citrate of iron and quinine are given, showing a range of from 8 to 12 per cent.

As in the case of the pills the quality of the alkaloid in t samples of citrate that I have assayed still remains to be tested.

Respectfully submitted,

G. C. CALDWELL,

Analys

REPORT

OF SAMUEL A. LATTIMORE, Ph. D.,

PUBLIC ANALYST,

ON

EXAMINATION OF DRIED APPLES.

The investigations on which this report is based were undertaken at the request of the President of the State Board of Health, in view of the vast and rapidly increasing quantities of dried apples and other dried fruits found in the market. It was deemed important that the manufacturing processes employed in preparing an article of food which is coming so rapidly into general use should be critically examined in order to ascertain if it suffers any unnecessary deterioration, or is treated with any foreign substances whose use might be considered prejudicial to health.

Until within a recent period the drying of fruit has been conducted only in the most primitive manner and without the aid of any facilities specially designed for such purposes. The heat of domestic fire indoors, or the warmth of the sun without, or, at most, a small and generally rude building containing a rough furnace sufficed to furnish the supply of dried fruit required for home consumption, with perhaps a slight excess for sale. The tough and leathery character of sun-dried fruits, and the brown and charred appearance of those dried by artificial heat did not recommend them to the taste. Their digestibility and nutritive value were greatly impaired. Under such circumstances the supply met the limited demand.

Gradually a higher degree of skill was applied to this industry, and the primitive methods have been greatly improved or rather entirely supplanted. An important stimulus in this direction was given during the late war under the exigency of the demand for vegetable food for our armies in the field, which sanitary science had long since shown to be so salutary and necessary. Fruits and vegetables in their fresh state were too perishable and bulky to bear transportation. Canned fruits and vegetables, while admirably preserving the natural qualities of the fresh article, retained all the original moisture or water averaging perhaps nine-tenths of the whole weight, often with the addition of still more water, thus increasing the weight of an article already heavy in comparison with the quantity of real nourishment contained in it. The great desideratum of getting clear of this large quantity of water, thereby reducing the bulk and weight to a small fraction of the original, and

at the same time rendering it capable of almost indefinite preservation and consequently of easy and cheap transportation, became for the first time clearly apprehended and led at once to the invention of greatly improved processes, based on an intelligent understanding of the principles involved.

A second stimulus was furnished, at least in many of the States of the Union, by the vast increase of fruit production in recent years. The irregularity of the fruit crop has shown the desirability of possessing some means of utilizing the maximum production which often exceeds the demand of the accessible markets during the limited period within which so perishable a commodity can be preserved. It was plain that some more rapid mode of drying would in a great measure meet this difficulty. These two main causes, conspiring with others of minor importance, have within a few years practically created a new industry, the extent and economic importance of which is even yet scarcely appreciated by the public. The extent to which inventive genius has responded to this demand is abundantly manifest in the multitudes of mechanical appliances which have been devised and patented for this purpose.

This industry presents some peculiar and interesting features involving certain economical as well as sanitary aspects. It deals with a raw material which is very bulky and exceedingly perishable and, therefore, unsuited for profitable transportation. Consequently the process of manufacture can never be profitably conducted at a distance from the place of production. It can never be concentrated in large establishments as are many other industries. The drying-house or *evaporator*, as it is technically called, must be near the orchard. Again, the present processes are of the simplest character and may, therefore, be successfully conducted by unskilled persons at low rates of compensation. An evaporator of convenient capacity is accordingly becoming a very common part of the equipment of the farmer who possesses an orchard even of moderate size, or in some neighborhood where fruit abounds, an establishment is erected of such proportions as to consume many thousands of bushels of apples during the season. This industry is in active operation for a period extending over several months, beginning with the earliest ripening fruit and continuing as long as winter apples can be preserved in sound condition, throughout the greater part of the winter season. A new source of income has in this way been opened and already has taken an important place among the industries of the country, and in no State more pre-eminently than in New York. The production of a new, palatable, and wholesome article of food at a very moderate price has naturally been met by a rapidly increasing demand at home and also in foreign countries, as shown by the large quantities exported.

Appreciating the magnitude of this industry and the fact that a practically new article of food is being placed on the market and consumed in enormous quantities, and that this food passes through a manufacturing process, which though simple and inexpensive, and

but imperfectly understood by the public, may possibly affect its wholesomeness, it was deemed the duty of the Board of Health to investigate as far as possible, the processes commonly employed in the drying or evaporating of apples, and also the nature and quality of the product as to its value as an article of food. It is proper to say that no complaint or plausible ground of suspicion has led to this investigation, but it has been undertaken simply to obtain definite information on a subject of public importance.

It may be well to explain that in the trade the term *evaporated* has assumed a technical signification, and is applied only to fruits dried by some one of the rapid modern processes, and is used in contradistinction to the term *sun-dried*, the meaning of which is self-evident. *An evaporator* is the apparatus used, however large or small.

The process has been studied in both large and small establishments and upon different forms of evaporators. While each of these may claim certain special merits, it is not necessary, for the purposes of this report, to enter into a description of the details of any of these forms of apparatus, or to discuss their several advantages. It will suffice to describe the process in general terms. The apples are pared, cored and sliced by machines, which are operated with great rapidity, either by hand or steam power. The slices, which are about half an inch thick, are placed in shallow trays or drawers, which are transferred to a closed box. In the base a small quantity of sulphur is kept burning. The arrangement is such that a number of these trays may be introduced at the same time, one above the other, and yet be exposed to the fumes of the burning sulphur — sulphurous acid — as it circulates among them, and finally escapes into the chimney. The object and effect of this treatment will be considered in a subsequent paragraph. After being submitted to the sulphuring treatment the slices are transferred to the drying screens. These consist of light rectangular wooden frames supporting the wire cloth woven of iron wire coated with zinc — *galvanized*. The size of the screens depends on the size of the evaporator. The sliced apples are spread on these screens in thin layers, and speedily transferred to the evaporator, which usually is constructed to hold a large number of screens at the same time. The heat is usually obtained from a simple furnace or stove, by the use of wood or coal. In some of the larger establishments steam heat is employed with advantage. It is highly important to keep the temperature within certain limits. If it is too low, the time of evaporation is too long; if too high, the fruit is charred. The temperatures observed in various forms of evaporators was found to vary from 95 deg. F. to 290 deg. F. About four hours suffice with this range of temperature to effect the evaporation of apples. The dried fruit is now removed from the screens, and thrown into large heaps, where it is suffered to remain until it is convenient to pack it in cases or barrels. The common cases are made to hold fifty pounds of evaporated fruit when it is tightly

compressed by powerful machinery. The product is now ready be sent to market.

It is found in practice that from eight to nine bushels of app weighing approximately fifty pounds per bushel, are required make one case of fifty pounds of evaporated product. In ot words, about seven-eighths of the weight of the green fruit expelled in the process of evaporation, in the form of water, remaining one-eighth representing the whole of the valuable nu ment of the fruit.

In order to fairly represent the value of evaporated apples as article of food, the following analyses were made. Fully-ripe fruit was selected and prepared for treatment in the ordinary w One portion was then evaporated while the other was reserved analysis in the fresh state. The analysis of the two samples g the following results, marked No. 1 and No. 2. As represe ing a low grade, the analysis marked No. 3, of a sample of south sun-dried apples, is selected:

	No. 1.	No. 2.	N
Water	87.10	12.37	15
Fruit sugar	6.24	43.66	3
Malic acid	.35	2.50	2
Dextrose and pectin	1.93	13.50	1
Nitrogenous substances	.28	1.38	1

These analyses are chosen from those made, as fairly represent the extremes found in many samples obtained in the open mark without selection, and coming, doubtless, from different parts of country. It should be remarked that a wide variation was found the moisture or water contained in evaporated apples, ranging fr ten to twenty per cent of the total weight. It is practically imp sible to expel the moisture entirely in the process of evaporati Just what proportion should be allowed to remain is difficult define. The present methods of evaporation, on account of the u voidable fluctuations of temperature, are not capable of produci constant and exact degrees of desiccation. Again, it is quite probal that different varieties of apples would be found to retain th native moisture with different degrees of tenacity.

Possibly it may be undesirable to expel the moisture to a grea extent than is attained in the more carefully-managed establis ments, as a higher temperature or a longer treatment, or both, wo be required, and in that case the sugar and other valuable constitue would begin to suffer decomposition, and the product would suf injury. Evaporated apples are highly hygroscopic, and when expo to damp air absorb a very considerable quantity of moistu Hence the advantage of packing them solidly in cases, whether transportation or preservation.

This investigation has revealed only two processes in the man facture of evaporated apples which may raise a question as to th admissibility on sanitary grounds. One of these is the *sulphuri*

process already described. As is well known the pulp of apple when exposed to the air darkens in color. The rapidity and extent of this change differs in different varieties; it is more marked in fully-ripened apples, and those containing the smallest per cent of acid. The fairer the color of the evaporated product the more it is appreciated by the consumer.

Several means have been employed to prevent this change of color. A very dilute solution of salt is efficacious, but its use is inconvenient and prolongs the drying process, and so far as ascertained is not in use. The almost universal practice is to use sulphurous acid derived from the burning of a small quantity of sulphur. A few moments' exposure of the sliced apples to this gas is sufficient to preserve the natural color during the subsequent evaporation. The question naturally arises, whether the dried fruit retains any of the sulphurous acid? In no case has the writer found any trace of this acid in evaporated apples or other fruit. In the absence of this acid, or any salts formed from it, the question may still arise whether it may not have been converted by oxidation into sulphuric acid, which would remain either in the free state or combined in the form of alkaline sulphates.

In explanation of the failure in every instance to find traces of free sulphuric acid, it may be alleged that in presence of alkaline salts of the organic acids it could not remain in the free state but would naturally enter into combination with the bases of these salts forming the corresponding sulphates. The solution of this question becomes far more difficult from the fact that fruits, in common with most vegetable substances, contain, among their mineral constituents, sulphates. Phosphoric acid is the chief mineral acid found in the apple and is usually present to the extent of 0.2 per cent. The sulphuric acid may be placed at half that quantity, or 0.1 per cent. As it is highly probable that the quantity of sulphates, small as it is, may vary with varying conditions of soil and climate, it would require a large number of analyses to fairly establish the limits of normal variation. Should it appear that the quantity of sulphates found in sulphured apples always exceeds the normal quantity, the excess would very reasonably be credited to the treatment. The comparative analyses of the samples of the same fruit, part of which had been treated with sulphur and part not, showed no wider difference than may be fairly referred to permissible error of experiment. The largest quantities found were so trivial that the writer cannot entertain the opinion that it exceeds the quantity of sulphuric acid normally belonging to that particular sample. It seems entirely reasonable that, during the brief exposure of the sliced apples to the action of the sulphurous acid, the gas is partially absorbed by the moist surfaces, but without penetrating the substance of the pulp, and that, when immediately afterward it is introduced into the evaporator, with a temperature at or often far beyond the boiling point of water, the sudden and rapid evaporation beginning over every part of the surface sweeps away with the cloud of steam every trace of this volatile acid.

The second step in the manufacturing process which has attracted attention on sanitary grounds is the fact that the screens, on which fruits are commonly dried, are made of wire cloth, protected with a coating of zinc (galvanized). The question very naturally arises whether the acid juices of the fruit do not attack this coating of zinc, forming a poisonous salt which may adhere to the fruit in larger or smaller quantity. The application of the most sensitive tests to apples, known to have both been treated with sulphurous acid and subsequently dried on galvanized screens, failed to indicate the slightest traces of the metal zinc. Nevertheless the screens suffer oxidation somewhat rapidly, and must be renewed after a few seasons' wear, and it seemed desirable to ascertain what becomes of this lost metal. A sample of galvanized iron-wire cloth, with meshes one-fourth of an inch in diameter, such as is commonly used, was found to contain thirty-three per cent of its weight of zinc. A second sample of a similar screen, which had been worn out by three seasons' use, was found to contain nine per cent of zinc. We have here a loss of twenty four per cent of zinc, which, considering the quantity of the wire fabric required in a single evaporator, amounts to a very considerable weight. A careful examination of the screens, however, while in use furnishes an explanation of this disappearance of the zinc from the iron wire.

As the dried fruit is swept from the screen on its removal from the evaporator, it is seen that the saccharine juices of the fruit had been rapidly evaporated in contact with the heated metal gauze, closely investing it as with a varnish. Where the sliced fruit happens to adhere slightly to the screen, its removal usually leaves a film adhering to the screen, instead of stripping away the more adherent coating of the wire. From this cause the meshes of the screens are rapidly closed to such an extent that the free circulation of the hot-air among the screens, which are placed one above the other, is obstructed. To meet this difficulty it becomes necessary at very frequent intervals to remove these accumulations from the screens, which is done by a vigorous scrubbing with water and brooms or stiff brushes. It is in this process, perhaps daily repeated, that so much of the zinc as may have been rendered soluble either by the sulphurous acid or by the acids of the fruit itself, is washed away, until the iron wire begins to be exposed and the screen becomes unfit for further use.

In conclusion, it appears plain that there can exist no well-founded cause of apprehension as to any dangerous contamination of evaporated apples or other fruit from either of those two sources. It is certainly a matter of congratulation that in the manufacture of an article of food already so extensively used and likely to come into still more common use, there exists but slight possibility of any deterioration of the nutritive value of the product by the addition, incidentally or otherwise, of any foreign substance. The process of evaporation is simply the rapid removal of the greater part of the water present in the green fruit, at such a temperature as to pre-

clude any important chemical changes in any of the several constituents. Consequently the addition of the same quantity of water at any subsequent time restores the dried pulp to a condition very closely approximating, both in taste and nutritive value, the fruit in its original state, and differing widely from fruit slowly dried by days of exposure in the open air.

The evaporating process, therefore, renders one of the most perishable of food articles capable of almost indefinite preservation without loss or deterioration. It renders a bulky article exceedingly compact, as evinced by the fact that a single case containing fifty pounds, and occupying less than two cubic feet, represents the entire nutritive value of from six to eight bushels of green apples weighing from three to four hundred pounds. The process of effecting this result is of the simplest and most inexpensive nature. Transportation is thus greatly facilitated, and a new article of the greatest hygienic value is added to the supplies of the army and navy.

It would be interesting to form a trustworthy estimate of the magnitude of this industry, which is almost exclusively confined to the United States. Reliable statistics, however, are unattainable for even a single State. "The Producers' Price Current" of January 2, 1886, reports the number of packages — a term which includes barrels as well as the ordinary fifty-pound packing case — received in New York city alone, during the year 1884, at 175,565, and, for the year 1885, at 143,981. The number of packages exported from New York during the same years is stated to be 93,455 and 76,596. At the last meeting of the New York Horticultural Society reports were read estimating that the production of evaporated apples in the four counties of Niagara, Orleans, Genesee and Wayne for the past season reached 7,425,000 pounds, or 148,000 boxes. It is believed by those who are inclined to consider this estimate too high, that the product of the State of New York for the last season is not less than 8,500,000 pounds. This quantity of evaporated product required nearly a million and a half bushels of green apples.

It may be added that enormous quantities of other fruits are being evaporated in the same manner.

From these considerations it appears that this rising industry is of great importance, not only in its economic aspects in rendering an extremely perishable commodity capable of indefinite preservation, in reducing all that is valuable in a bulky article to a small space, thus rendering it easily transportable, but especially in furnishing a most wholesome and valuable article of food at a price which places it within the reach of the humblest.

S. A. LATTIMORE.

REPORT

ON THE

EXAMINATIONS OF BEERS.

REPORT ON BEER.

To Hon. Erastus Brooks, *Chairman of the Executive Committee:*

Sir.— I have the honor to submit the following report on the work assigned to me by resolution of the Board, passed June 15, 1885, namely: Resolved, That the assistant secretary be authorized to make arrangements for the collection of samples of spirituous, fermented or malt liquors for analysis in accordance with chapter 176 of the Laws of 1885, and that the whole business arrangement for the enforcement of said law be referred to him under the direction of the Executive Committee."

REPORT.

This law requires that "the Board shall at least once in the calendar year cause samples to be procured in public market or otherwise, of the spirituous, fermented or malt liquors distilled, brewed, manufactured or offered for sale in each and every brewery or distillery located in this State, and a test sample or analysis thereof to be made by a chemist or analyst duly appointed by said Board of Health."

The provision being thus specific, the question of the best method of carrying out its intent was the first confronted. Many difficulties incumbered the purchase of these samples, mainly in open market, owing to the very great number of saloons involved. To ascertain the particular brand sold in each would have needed more time and expense than was at command. There was also risk of such collections being imperfect, and the brewers unfairly and incompletely represented.

It seemed more feasible, therefore, to collect the samples directly from the breweries and to supplement them by others purchased in the saloons, thus at once showing the character of the beverages as brewed and as actually retailed to consumers. This course was finally adopted.

By correspondence with the Internal Revenue Department, an official list was obtained of all the brewers and distillers in the State, and these were properly recorded in a register specially prepared for the purpose.

In order that the brewers might be fully apprised of the law, the following notice was mailed to their various addresses:

NOTICE.

The State Board of Health hereby notifies all distillers or brewers of spirituous, fermented or malt liquors in the State of New York, that on April 29, 1885, the Legislature passed a law known as chapter 176 a copy of which is appended to this statement.

This law, in addition to the duties covered by chapter 407 of 1881 concerning which regulations of the Board have already been framed and published, specifically imposes upon the State Board of Health the duty of making at least annually an examination of samples of the "spirituous, fermented or malt liquors distilled, brewed, manufactured or offered for sale in each and every brewery or distillery located in this State."

The State Board of Health at its annual meeting in New York city on May 14, 1885, adopted measures for the carrying out of the spirit and purpose as well as the letter of the proposed law.

The State Board of Health hereby gives notice that in this as well as in all other matters intrusted to its administration it will endeavor to discharge its duty impartially, without fear or favor, relying upon the co-operation of all good citizens and upright manufacturers for the successful enforcement of the statute.

While in no case will violations of the law be condoned or connived at, yet the investigations will be conducted in a spirit of fairness and with a proper regard for all vested business interests.

Information of the violation of any of the provisions of the statute will at all times be gladly received at the Central Office, where such use of it will be made as in the judgment of the Board will best carry out the intent of the law and best conserve the interests of the public.

ALFRED LUDLOW CARROLL, M. D.,

ALBANY, *June* 20, 1885. *Secretary.*

By resolution of the Board, Dr. Englehardt was elected chemist to analyze the various samples. Having before served the Board acceptably as chemist in the department of wines, beers, spirits and cordials, under the old law, "To prevent the adulteration of food and drugs," his selection was considered the best that could be made.

The limited funds at the Board's disposal for the work, $3,000, made it necessary to secure the lowest possible terms for each analysis as otherwise the number to be made would have exhausted an appropriation many times larger. An arrangement was finally entered into with Dr. Englehardt by which he agreed to make the analysis at minimum rates, and the following form of analysis agreed upon:

Color	Ash, per cent ....
Transparency	Phosphoric acid, per cent
Specific gravity	Water, per cent ....
Alcohol by weight, per cent..	Substitute for hops......
Extractive matter, per cent...	Substitutes for malt ....
Sugar, per cent	

Remarks: *Analyst.*

The law provides that the "samples shall be kept in vessels and in a condition necessary and adequate to obtain a proper test and analysis of the liquors contained therein. The vessels containing such samples shall be properly labeled and numbered by the secretary of said Board of Health, who shall also prepare and keep an accurate and proper list of the names of the distillers, brewers or vendors, and opposite each name shall appear the number which is written or printed upon the label attached to the vessel containing the sample of the liquor manufactured, brewed, distilled or sold. Such lists, numbers and labels shall be exclusively for the information of the said Board of Health, and shall not be disclosed or published unless upon discovery of some deleterious substance prior to the completion of the analysis, except when required in evidence in a court of justice. The samples when listed and numbered shall be delivered to the chemist, analyst, or other officer of said Board of Health, and shall be designated and known to such chemist, analyst or officer only by its number, and by no other mark or designation. The result of the analysis or investigation shall thereupon, and within convenient time, be reported by the officer conducting the same to the secretary of said State Board of Health, setting forth explicitly the nature of any deleterious substance, compound or adulteration which may be detrimental to public health and which has been found upon analysis in such samples, and stating the number of the samples in which said substance was found. Upon such examination or analysis the brewer, distiller or vendor in whose sample of spirituous, fermented or malt liquor such deleterious substances, compounds or adulterations shall be found, shall be deemed to have violated the provisions of this act, and shall be punishable as prescribed in section seven of this act.

To satisfy these conditions bottles and cases were ordered specially marked with the State Board's imprint, and a cool cellar rented convenient to the chemist, where the beers could be kept at proper temperature awaiting analysis. Tags were also prepared (of which the following is a specimen), to be tied on the samples as they were collected:

> No. The State Board of Health, Date, .
> Sample of .
> Purchased of ,
> Brewed or distilled by .
> Collector's name.

These tags were removed from the sample on its reaching the Central Office, and a label, with a certain number, of which the following is a sample, pasted on:

> STATE BOARD OF HEALTH,
> Chapter 176, 1885.
> *Secy's No.* .

The samples as sent to the chemist were labeled with the above label and contained no other information than the secretary's number.

Located as the breweries are all over the State, it was necessary to have a special collector, a man of thorough integrity, who could give his whole attention to the work. Fortunately there was available at the time one who had been in the Board's service formerly, and an arrangement was made with him at the moderate rate of $2 a day and expenses, to make the collections for the entire State excepting in the cities of New York and Brooklyn where the breweries are so numerous and so close together, that it was thought hotel and traveling expenses might be saved by employing a person who had his home in one or other of these cities. Collecting was begun in the city of Albany on the 15th day of July, 1885, and continued with slight interruption till November 25, 1885.

An effort was made to take such sanitary observations as might be useful to the Board in making its recommendations, by thoroughly inspecting every brewery. The collections were necessarily retarded somewhat by this course, but the gain was more than compensatory in the information obtained.

The law requiring that each sample be marked by the secretary before forwarding it to the chemist for analysis, added to the expense of expressage, making in fact three expressages, one in shipping the empty case of bottles to the point where the collections were to be made, the second in forwarding them after the samples had been collected to the Central Office to have the tags removed and numbered labels pasted on, and the third, in the transfer of the samples properly marked to the chemist for analysis.

That no one could tamper with these each case was locked. The keys for the cases were made in triplicate, one being held by the collector, the second at the Central Office, and the third being in the possession of the chemist.

The law also requiring that the results of the analyses should be for the exclusive information of the Board, the returns from the analyst were kept under lock and key.

The following is a tabulation of all the analyses received from Dr. Englehardt. They are numbered consecutively, but the names of the brewers are withheld. His own report, which is separately given, will speak for itself. The beers were found to be heavily salted.

BEER ANALYSIS.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
1 Ale	1021.70	3.748	7.262	0.2737	0.0595	88.990	None found	Apparently glucose	Ash was white, contained no excess of carbonates, beer perhaps slightly salted.
2 Ale	1020.80	4.955	7.340	0.305	0.066	87.705	None found	Apparently glucose	Ash white, no excess of carbonates, beer has been salted.
3 Porter	1007.73	5.429	4.440	0.347	0.0708	90.131	None found	From low per ct. of phosphoric acid we conclude glucose	The ash was white, there were no carbonates in excess present, but unquestionably salt had been added to beer.
4 Weiss	1002.42	1.856	1.408	0.148	0.028	96.736	None	Apparently glucose; phosp'ric acid small amount	This sample of beer must be a kind of Weiss beer, both the alcohol and extract being too low for ale, porter or lager. Taste, sour and insipid. The ash was white (absence of iron), no excess of carbonates present, but salt has been added to the beer.
5 Lager	1014.96	3.861	5.644	0.2485	0.0915	90.495	None found	Questionable	Ash white, no excess of carbonates, no salt added.
6 Porter	1011.635	4.043	4.900	0.288	0.052	91.057	None found	Glucose very likely used	Ash white, no excess of carbonates, some salt, perhaps, added.
7 Ale	1012.86	4.833	5.511	0.320	0.092	89.656	None found	None apparently used	Ash white, no excess of carbonates present, salt has been added.
8 Ale	1019.01	3.866	6.716	0.244	0.0612	89.418	None found	Questionable	Ash white, no excess of carbonates, some salt added to the beer.
9 Porter	1012.429	5.145	5.544	0.278	0.071	89.311	None found	Questionable	Ash white, no excess of carbonates present, beer is salted.
10 Lager	1022.14	4.127	7.587	0.317	0.117	88.286	None found	Questionable	Ash white, no excess of carbonates nor salt present.
11 Ale	1021.676	5.093	7.743	0.319	0.0904	87.1640	None found	Questionable	Ash white, no carbonates present in excess, apparently some salt added.
12 Lager	1011.42	3.949	4.770	0.253	0.0833	91.281	None found	None	Ash white, no carbonates in excess, no salt added to the beer.
13 Ale	1018.89	4.144	6.790	0.271	0.082	89.066	None found	Glucose apparently	Ash white, no excess of carbonates present.
14 Ale	1003.26	6.125	3.560	0.346	0.100	90.315	None found	Questionable	Ash white, no excess of carbonates, no salt added to the beer.
15 Ale	1012.44	4.410	5.280	0.410	0.107	90.310	None found	None found	Ash white, no excess of carbonates, no salt added to the beer.
16 Ale	1009.20	7.176	5.560	0.420	0.113	86.844	None found	Glucose ap'ar'tly us'd	Ash white, no excess of carbonates present, beer is not salted.
17 Ale	1005.62	1.476	3.725	0.291	0.101	91.799	None found	Questionable	Ash was white, no excess of carbonates present, salt seems added.
18 Lager	1016.08	3.795	8.354	0.239	0.0755	90.351	None found	Apparently none us'd	Ash white, no carbonates in excess, nor salt.
19 Lager	1013.40	5.139	5.497	0.2339	0.080	89.364	None found	Questionable	Ash white, carbonate not excessively present, beer is not salted.
20 Ale	1020.54	4.245	7.439	0.285	0.1064	88.316	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt 0.0137 per cent.
21 Porter	1012.90	4.202	5.283	0.265	0.09079	90.515	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as common salt, 0.0184 per cent.
22 Porter	1016.77	4.304	6.274	0.3027	0.1066	89.422	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0229.
23 Ale	1022.57	2.393	6.875	0.268	0.0924	90.732	None	None	Ash white no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0228.
24 Ale	1006.72	7.091	4.087	0.347	0.0995	88.822	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0418 per cent.
25 Porter	1024.11	5.744	7.951	0.266	0.07155	86.305	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0297 per cent.
26 Ale	1022.94	4.309	7.768	0.2827	0.08901	87.923	None	None	Ash of beer was white, containing no excess of carbonates, sulphates of lime in traces, chlorine calculated as salt, 0.01945 per cent.
27 Porter	1021.52	4.147	8.044	0.371	0.112	87.809	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0707 per cent.
28 Lager	1016.21	4.221	6.054	0.2200	0.08539	89.725	None	None	Ash of the beer was white, no excess of carbonates, no sulphates present, chlorine figured as salt, 0.0023 per cent.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
29 Ale	1015.30	5.693	6.505	0.253	0.08057	87.802	None	None	Ash white, no excess of carbonates, sulphates very heavy traces, chlorine, when calculated as salt, 0.01838 per cent.
30 Porter .	1016.81	3.298	5.851	0.258	0.0674	88.851	None	None	Ash white, no excess of carbonates, of sulphates very strong traces, chlorine calculated as salt, 0.0367 per cent.
31 Lager...	1014.04	3.6370	5.3120	0.1847	0.08065	91.051	None	None	Ash white, no excess of carbonates, sulphates not present, chlorides calculated as salt, 0.0023.
32 Ale	1015.93	8.994	7.929	0.465	0.1156	83.077	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.08762 per cent.
33 Lager ...	1012.37	4.689	5.368	0.247	0.06830	89.943	None	None ?..........	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0208.
34 Weiss...	1007.83	2.400	2.865	0.2517	0.0335	94.735	None	None ?........................	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.1350 constituting over one-half of the ash. Must be a Weiss beer.
35 Ale	1014.04	7.444	6.929	0.307	0.07907	85.627	None	Yes	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.06237.
36 Ale	1013.33	4.079	5.341	0.238	0.0748	90.580	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0300.
37 Porter .	1020.42	3.333	6.779	0.3774	0.07957	89.888	None	Questionable ?............	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.07957.
38 Ale	1018.67	3.868	6.571	0.2702	0.0792	89.561	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.03903 per cent.
39 Ale	1006.53	5.092	4.045	0.271	0.08503	90.863	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0185 per cent.
40 Ale	1013 34	4.653	5.588	0.231	0.06714	89.759	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.07167.
41 Ale	1002.38	5.739	3.199	0.3173	0.08388	91.062	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.01187.
42 Lager...	1014.32	3.839	5.478	0.2384	0.08915	90.683	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.02097.
43 Lager...	1015.83	3.504	5.696	0.270	0.08407	90.800	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.00345.
44 Porter .	1008.92	6.625	5.282	0.3830	0.1487	88.093	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.02085 per cent.
45 Ale	1016.35	4.546	6.267	0.3161	0.1017	89.187	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0437.
46 Ale	1006.82	6.643	4.751	0.322	0.1042	88.615	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0395.
47 Ale	1008.48	6.5308	5.124	0.3816	0.1562 !	88.3452	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.03247.
48 Porter	[illegible]	4.316	[illegible]	0.270	[illegible]	[illegible]	None	None	[illegible]

51 Ale	1012.74	3.938	5.125	0.346	0.0661	90.937	None	Apparently..................	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.08579.
52 Lager....	1021.71	5.109	7.830	0.347	0.104	87.061	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0227 per cent.
53 Lager....	1011.97	3.866	4.907	0.361	0.08451	91.227	None	Questionable.................	Ash white, no excess of carbonates, sulphates giving heavy precipitates, chlorine calculated as salt, 0.0300.
54 Lager....	1015.64	3.584	5.688	0.276	0.0907	90.728	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, equal to 0.01617 per cent.
55 Lager....	1009.88	3.979	4.397	0.217	0.08452	91.624	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.00928 per cent.
56 Lager....	1009.03	3.967	4.157	0.281	0.08127	91.876	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0185.
57 Lager....	1012.42	4.845	5.443	0.306	0.1089	89.712	None	None	Ash white, no excess of carbonates, sulphates none, chlorides figured as salt, 0.0023 per cent.
58 Lager....	1009.95	4.376	4.607	0.284	0.09001	91.017	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0162 per cent.
59 Lager....	1012.26	3.423	4.803	0.272	0.08714	91.774	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0346 per cent.
60 Ale	1011.88	5.798	5.698	0.341	0.10188	88.504	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0115 per cent.
61 Ale	1009.63	7.537	5.699	0.294	0.08048	86.764	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.00923 per cent.
62 Lager....	1019.44	4.798	7.207	0.328	0.05675	87.995	None	Yes	Ash white, no excess of carbonates, sulphates very heavy traces, the chlorine calculated as salt, equal to 0.0823 per cent.
63 Lager....	1020.40	4.302	7.285	0.318	0.07193	88.413	None	None ?........................	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.05727 per cent.
64 Lager....	1009.10	4.601	4.464	0.2747	0.10129	90.935	None	None ?........................	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0203 per cent.
65 Ale	1020.38	4.465	7.248	0.235	0.0744	88.287	None	Doubtful, am inclined to think substitutes have been used......	Ash white, carbonates none in excess, sulphates very heavy indeed, chlorine calculated as salt, 0.059 per cent.
66 Ale	1006.36	5.460	4.140	0.318	0.1102	90.400	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0511 per cent.
67 Lager....	1019.30	2.937	6.280	0.216	0.06548	90.7822	None	None	Ash white, no excess of carbonates, sulphates very heavy traces, chlorine calculated as salt, 0.0115 per cent.
68 Lager....	1011.94	4.490	5.409	0.230	0.0700	90.101	None	None	Ash white, no excess of carbonates, sulphates in very heavy traces, chlorine calculated as salt, 0.01380.
69 Ale	1020.60	3.507	6.900	0.280	0.0869	89.593	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.057.
70 Ale	1017.04	4.370	6.352	0.287	0.0787	89.278	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.046.
71 Ale	1020.02	4.160	6.789	0.361	0.0949	89.021	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0759.
72 Porter ..	1018.05	4.548	6.716	0.437	0.09516	88.736	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.08767.
73 Ale	1020.17	5.185	6.985	0.345	0.1144	87.830	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.039.
74 Weiss....	1003.96	2.1122	1.9295 !	0.1390	0.03763	95.9583	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0465 per cent.
75 Weiss....	1007.13	2.572	3.045	0.229	0.0632	94.383	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0394.
76 Weiss....	1009.92	2.766	3.842	0.468	0.0398	93.392	None	None	Ash white, no excess of carbonates, sulphates faint traces, chlorine calculated as salt, 0.338 ! ! !
77 Weiss..	1005.50	1.600	2.205	0.176	0.0304	96.195	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0862 per cent.
78 Ale	1004.19	5.792	3.696	0.319	0.1033	90.512	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0093 per cent.

BEER ANALYSIS — Continued.

Number sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
79 Porter.	1017.30	5.224	6.840	0.217	0.0825	87.936	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0023.
80 Ale	1020.72	4.622	7.399	0.270	0.0965	87.979	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0275 per cent.
81 Porter	1018.50	4.797	6.669	0.254	*0.1114	88.504	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.022.
82 Lager	1017.09	3.879	6.124	0.246	‡0.108	89.997	None	None	Ash white, no excess of carbonates, sulphates, faint trace, chlorine calculated as salt, 0.0069. A very fine sample of beer.
83 Lager	1017.21	4.063	6.275	0.236	0.103	89.662	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.00115 per cent. Good beer.
84 Ale	1015.93	4.997	6 170	0.262	0.06729	88.833	None	Questionable?	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.023 per cent.
85 Lager	1015.43	4.515	5.993	0.3065	0.08333	89.492	None	None	Ash white, no excess of carbonates, sulphates very strong, chlorine calculated as salt, 0.0344 per cent.
86 Ale	1019.27	3.922	6.769	0.245	0.0881	89.309	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0275 per cent.
87 Lager	1013.57	3.844	5.285	0.236	0.0862	90.871	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0277 per cent.
88 Ale	1012.22	4,730	5.194	0.235	0.09335	90.079	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0092, sulphates in traces.
89 Porter.	1014.14	4.139	5.573	0.279	0.08169	90.288	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0438 per cent. Beer had a sour taste.
90 Ale	1015.03	4.964	6.115	0.215	0.06503	88.921	None	None	Ash white, no excess of carbonates, sulphate in strong traces, chlorine calculated as salt, 0.0115 per cent.
91 Porter	1021.32	4.150	7.371	0.274	0.0694	88.478	None	Qust'nable, phosp'ric acid too low	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.0160.
92 Ale	1012.74	2.431	4.401	0.305	‡0.1165	93.165	None	None	Ash white, carbonates not in excess, sulphates very strong traces, chlorine calculated as salt, 0.0553.
93 Porter	1013.53	3.562	5.164	0.284	0.0954	91.274	None	None	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.023 per cent.
94 Lager	1021.07	3.260	6.913	0.287	0.1023	89.827	None	None	Ash white, no carbonates, no sulphates, chlorine in traces. Good sample of beer.
95 Weiss	1005.61	0.790	1.836	0.195	0.0424	97.374	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine very heavy, calculated as salt, 0.1049 per cent! Very heavily salted.
96 Lager	1018.47	3.752	6.227	0.277	0,08654	90.021	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine, calculated as salt, 0.0183 per cent.
97 Lager	1018.24	3.195	6.162	0.254	0.08815	90.643	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0044 per cent.
98 Weiss	1005.86	0.913	1.966	0.142	0.277	97.121	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0627 per cent. A kind of Weiss beer.
99 Weiss	1005.04	1.424	1.973	0.1237	0.0853	96.603	None	None?	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0582 per cent. A kind of Weiss beer.
100 Weiss	1008.06	1.936	2.520	0.240	0.0355	95.534	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine heavy, equal to 0.141 per cent of salt. Kind of Weiss beer, sour taste.

101 Lager...	1023.38	2.373	7.054	0.222	[illegible]	90.361	None	None	Ash white, no excess of carbonates, sulphates and chlorine in traces. Good sample of beer in appearance and taste, except slightly pitchy.
102 Lager...	1012.64	4.181	5.183	0.345	0.0855	90.636	None	None	Ash white, no excess of carbonates, no sulphates, chlorine in traces, taste somewhat pitchy.
103 Lager...	1022.93	3.681	7.308	0.227	0.0905	89.011	None	None	Ash white, no carbonates, no sulphates, chlorine trace, beer has a taste of pitch.
104 Lager...	1012.28	3.780	4.931	0.241	0.0906	91.286	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0046 per cent.
105 Lager...	1013.34	3.796	5.024	0.174	0.06935	91.180	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0023 per cent, tastes after pitch.
106 Lager...	1019.48	2.873	6.301	0.202	0.08409	90.826	None	None ?	Ash white, no excess of carbonates, sulphates none, chlorine calculated as salt, 0.0023 per cent.
107 Ale	1019.71	4.239	7.014	0.367	0.07620	88.747	None	Apparently.	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.1263 per cent ! very heavy salted beer.
108 Porter	1017.07	3.857	6.157	0.222	0.0831	89.966	None	None	Ash white, carbonates not in excess, sulphates in very heavy traces, chlorine calculated as salt, 0.06901 per cent.
109 Ale	1026.50	3.7409	8.379	0.304	0.0862	87.8901	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0456.
110 Porter	1025.98	4.318	8.506	0.2914	0.08875	87.176	None	None	Ash white, no excess of carbonates, sulphates in very heavy traces, chlorine calculated as salt, 0.03418 per cent.
111 Ale	1025.10	4.333	8.291	0.321	0.1047	87.373	None	None	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.0571 per cent.
112 Porter	1007.02	5.123	4.373	0.348	0.1173	90.504	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0441 per cent.
113 Weiss...	1007.17	3.179	3.315	0.164	0.04916	93.506	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, 0.0023. Of this Weiss beer both bottles contained less than one quart, the beer seemed to have been very scarce indeed. Very slightly sour.
114 Weiss...	1005.77	2.281	2.543	0.104	0.06117	95.176 !	None	None	Ash white, no excess of carbonates, no sulphates, no chlorine. A poor sample of Weiss beer to say the best. Slightly sour.
115 Porter	1012.93	4.379	5,377	0.272	0.09568	90.244	None	None	Ash white, no excess of carbonates, sulphates in very slight traces, chlorine calculated as salt, 0.045, beer was sour.
116 Ale	1014.80	2.848	5.186	0.309	0.1206 !	91.986	None	None ?	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0336 per cent. Remarkably high percentage of phosphoric acid.
117 Lager...	1021.06	3.617	7.087	0.237	0.08559	89.296	None	None	Ash white, no excess of carbonate, sulphates in traces, chlorine calculated as salt, 0.0023 per cent.
118 Ale	1023.90	3.925	7.821	0.350	0.1114	88.251	None	None	Ash white, no excess of carbonates, sulphates very strong, chlorine calculated as salt, 0.0371 per cent.
119 Porter	1021.10	3.723	7.133	0.300	0.07417	89.144	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0481.
120 Ale	1018.36	5.500	7.225	0.293	0.08567	87.275	None	None	Ash white, no excess of carbonates, sulphates in slight traces, chlorine calculated as salt, 0.0503 per cent.
121 Porter	1028.27	1.671	7.834	0.432	0.0876	90.495	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.1095 ! heavily salted.
122 Lager...	1019.80	4.010	6.938	0.196	0.09019	89.052	None	None ?	Ash white, no excess of carbonates, sulphates in slight traces, chlorine calculated as salt, 0.0023.
123 Ale	1015.89	4.991	6.348	0.349	0.0902	88.661	None	None	Ash white, no excess of carbonic acid, sulphates in strong traces, chlorine calculated as salt, 0.0831 per cent.
124 Porter	1017.01	4.534	6.429	0.274	0.0886	89.037	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.046 per cent.
125 Ale	1005.45	6.175	4.140	0.331	0.1174	89.684	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0023 per cent, fine sample of beer, very slightly sour.
126 Porter	1016.13	2.639	5.391	0.309	0.1113	91.970	None	None	Ash white, no excess of carbonates sulphates in traces, chlorine calculated as salt, 0.0092 per cent.
127 Lager...	1015.71	4.114	5.951	0.212	0.08817	89.035	None	None	Ash white, no excess of carbonates, no sulphates, chlorine a mere trace. A good beer.

* High for ash. † High. ‡ Very high.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
128 Weiss...	1003.66	1.202	1.534	0.114	0.03055	97.264	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0093 per cent. A poor kind of Weiss beer.
129 Ale	1007.11	5.003	4.101	0.257	0.0666	89.896	None	None	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0511. Beer slightly sour.
130 Ale	1001.369	5.440	2.805	0.4072	0.0947	89.755	None	Questionable	Ash white, no excess of carbonates, sulphates in traces, salt calculated from chlorine found, 0.0854. Beer is salted.
131 Ale	1009.77	3.444	4.092	0.226	0.0542	92.464	None	Apparently..................	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.1831, hence the beer is salted.
132 Lager...	1015.09	0.677	4.152	0.388	0.0584	95,171	None	Yes	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.0323. Beer is sour.
133 Lager...	1011.20	3.436	4.472	0.313	0.0919	92.092	None	None?..........................	Ash white, no excess of carbonates, no sulphates, chlorine as salt calculated, 0.0115.
134 Lager...	1009.18	3.958	4.175	0.2828	0.0619	91.867	None	Apparently..................	Ash white, no excess of carbonates, sulphates in traces, chlorine as salt calculated, 0.0673.
135 Ale	1005.83	6.497	4.462	0.280	0.0815	89.041	None	None	Ash white, no excess of carbonates, sulphates present in traces, chlorine as salt calculated, 0.0116 per cent.
136 Ale	1007.26	5.627	4.315	0.307	0.0947	90.058	None	None	Ash white, no excess of carbonates, sulphates present in traces, chlorine calculated as salt, 0.0186.
137 Porter..	1006.52	5.760	4.282	0.283	0.1067	89.958	None	None	Ash white, no excess of carbonates or sulphates, chlorine calculated as salt, 0.0233. Beer is somewhat sour.
138 Lager...	1011.46	4.4904	5.0146	0.328	0.0557	90.495	None	Yes.............................	Ash white, no excess of carbonates, chlorides heavy, hence the beer is salted, sulphates strong traces.
139 Ale	1002.42	5.924	3.125	0.355	0.107	90.951	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.108, hence the beer is salted; taste sour.
140 Ale	1010.42	3.556	4.323	0.247	0.0439	92.119	None	Yes....................	Ash is white, no excess of carbonates, sulphates strong traces, chlorides heavy, hence the beer must be salted. Beer is slightly sour.
141 Ale	1010.838	3.866	4.602	0.208	0.085	91.532	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0974, beer is therefore salted.
142 Ale	1006.49	4.309	3.652	0.324	0.1016	92.039	None	None	Ash white, no carbonates in excess present, beer has a good taste, not tested as yet for chlorides and sulphates.
143 Porter .	1018.62	5.792	6.122	0.4916	0.0988	84.086	None	Doubtful	Ash white, no excess of carbonates, chlorine, though not determined, very heavy, hence the beer is salted; ash is very high, sulphates heavy, has a slightly sour taste.
144 Ale	1013.77	3.8720	5.2748	0.306	0.06068	90.8532	None	Yes..........	Ash white, carbonates not in excess, taste not very good, chlorine calculated as salt, 0.113, hence the beer is salted.
145 Porter.	1011.25	3.838	4.672	0.234	0.080	91.490	None	None	Ash white, no excess of carbonates, the beer is slightly sour, chlorine calculated as salt, 0.013, probably some salt added.
146 Lager...	1008.42	4.334	4.143	0.292	0.0971	91.523	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0046.
147 Ale	1004.73	6.770	4.190	0.284	0.0971	89.040	None	None	Ash white, no excess of carbonates, beer is slightly acid, chlorine as salt calculated, 0.0023, hence not salted.
148 Ale	1004.90	1.967	2.938	0.231	0.0714	95.096	None	None	Ash white, carbonates not in excess, chlorine as salt calculated, 0.0046. Too sour to drink.
149 Porter .	1013.52	4.126	5.405	0.302	0.0671	90.470	None	None, apparently......	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0786. Beer has a sour taste.
150 Ale	1017.90	4.176	6.549	0.339	0.0733	89.276	None	Apparently..................	Ash white, no excess of carbonates, sulphates and salt in traces.

						...077	None	Yes	Ash white, no excess of carbonates, but sulphates heavy, salt has been added.
		...009	6.702	0.273	0.0001	89.690	None	None	Ash white, no excess of carbonates, salt must have been added, sulphates heavy.
... .	1012.94	2.419	4.441	0.308	0.0905	93.140	None	Doubtful	Ash white, no excess of carbonates found, salt has been added to the beer, sulphates heavy.
154 Ale	1002.52	5.681	3.198	0.366	0.109	91.121	None	None	Ash white, no excess of carbonates found, beer appears salted, sulphates traces.
155 Weiss...	1008.55	1.414	2.867	0.069	0.038	95.719	None	Apparently none.	Ash white, no carbonates present in excess, no salt added, must be a kind of Weiss beer.
156 Ale	1010.32	6.002	5.437	0.357	0.0714	88.561	None	Either grape sugar or glucose	Ash white, no excess of carbonates, appears to have received an addition of salt.
157 Lager...	1014.56	3.632	5.430	0.230	0.0714	90.938	None	None	Ash white, carbonates not in excess, not salted.
158 Ale	1011.90	3.834	4.812	0.285	0.0771	91.354	None	None apparently	Ash white, no carbonates to excess, beer has been salted, beer somewhat sour.
159 Ale	1016.03	3.140	5.595	0.281	0.0666	91.265	None	Used to some extent.	Ash white, carbonates not in excess, salt added.
160 Ale	1010.13	8.333	6.738	0.285	0.0771	84.929	None	Undoubtedly used	Ash white, no excess of carbonates, beer is salted. A very heavy and old ale.
161 Porter ..	1006.32	5.608	4.213	0.307	0.0976	90.179	None	None	Ash white, carbonates not in excess, no salt added.
162 Ale	1011.20	3.861	4.685	0.252	0.098	91.454	None	None	Ash white, carbonates not excessive, beer salted.
163 Malt wine	1010.53	4.758	4.918	0.298	0.0895	90.324	None	None	Ash white, no carbonates, beer is salted.
164 Ale	1008.08	6.476	4.981	0.424	0.117	88.541	None	None	Ash white, carbonates not excessive, apparently salted.
165 Porter .	1015.39	5.289	6.348	0.507	0.171	88.363	None	None	Ash white, carbonates not excessive, salted apparently.
166 Ale	1020.58	3.873	7.081	0.362	0.0838	89.046	None	Apparently	Ash white, carbonates not to excess, beer is salted.
167 Ale	1021.41	5.249	7.862	0.329	0.096	86.889	None	None	Ash white, carbonates not excessive, free of salt.
168 Ale	1013.68	4.796	5.722	0.282	0.0719	90.482	None	Questionable	Ash white, carbonates not excessive, beer is apparently salted.
169 Ale	1001.42	7.494	3.620	0.352	0.100	88.886	None	None	Ash white, carbonates not excessive, salt is not apparently added; a very old beer.
170 Lager....	1018.17	4.415	6.672	0.276	0.0838	88.913	None	None	Ash white, carbonates not excessive, no salt added.
171 Ale	1018.68	3.882	6.563	0.308	0.0406	89.555	None	Used	Ash white, no excess of carbonates, beer salted apparently.
172 Ale	1007.44	6.351	4.754	0.345	0.0623	88.895	None	Used	Ash white, carbonates not excessive, beer is salted.
173 Lager....	1018.35	3.784	4.682	0.295	0.091	91.534	None	None	Ash white, neither carbonates nor salt present.
174 Lager....	1018.60	3.065	6.131	0.237	0.088	90.804	None	None	Ash white, no salt used.
175 Lager....	1013.22	2.682	4.663	0.263	0.050	92.655	None	Apparently	Ash white, carbonates not excessive, salted.
176 Ale	1001.90	6.710	3.421	0.339	0.112	89.867	None	None	Ash white, carbonates not excessive, salted.
177 Ale	1012.19	3.252	4.694	0.254	0.056	92.054	None	Some used apparently	Ash white, no carbonates, but salt used.
178 Ale	1013.44	4.183	5.446	0.298	0.0738	90.371	None	None apparently	Ash white, carbonates not excessive, salt seems to have been used.
179 Lager....	1022.37	3.303	7.238	0.224	0.069	89.459	None	None	Ash white, no excess of carbonates, some salt used.
180 Lager ...	1013.58	3.998	5.371	0.243	0.08275	90.631	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.00693 per cent, sulphates in traces.
181 Ale	1018.33	5.786	7.3209	0.4053	0.1027	86.8931	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1218! heavy salted, sulphates in heavy traces.
182 Porter ..	1008.45	5.651	4.757	0.5354	0.1420	89.592	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1171! heavy salted, sulphates in strong traces, beer had a sour and musty taste, unfit to drink.
183 Ale	1007.67	5.734	4.592	0.3373	0.0960	89.674	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.06268 per cent, sulphates in strong traces.
184 Lager....	1018.64	4.129	6.673	0.308	0.1000	89.198	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, sulphates in slight traces.
185 Lager....	1019.86	3.569	6.734	0.262	0.0989	89.697	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates none.
186 Lager ...	1015.48	3.130	6.245	0.231	0.942	90.625	None	None	Ash white, carbonates not in excess, chlorine calculated as salt, 0.0023, sulphates none.
187 Ale	1016.32	4.436	6.226	0.3659	0.1010	89.338	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0669, beer is salted, sulphates in traces.
188 Lager....	1015.05	4.342	5.141	0.3059	0.08714	90.517	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0[illegible] per cent, sulphates in traces.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
189 Ale	1015.19	4.414	5.753	0.4035	0.1042	89.833	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.06017 per cent. sulphates in traces.
190 Ale	1010.97	4.993	5.118	0.363	0.08398	89.889	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0981, beer is salted.
191 Porter	1016.98	4.973	6.644	0.557 !	0.12767	88.383	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0992, heavily salted, sulphates strong traces, beer has a sour taste.
192 Ale	1007.93	4.842	4.255	0.311	0.0644	90.903	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0743, sulphates in traces.
193 Ale	1009.19	3.588	4.027	0.367	0.06202	92.385	None	Yes	Ash white, no excess of carbonates, chlorine calculated as salt, 0.079 per cent, sulphates in strong traces.
194 Lager	1013.14	2.205	4.884	0.243	0.0693	92.911	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0208, sulphates in traces.
195 Ale	1010.77	4.379	4.765	0.3224	0.0999	90.856	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0440, sulphates in traces.
196 Lager	1010.94	4.902	5.101	0.2398	0.0967	89.997	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates very faint traces.
197 Lager	1014.00	3.735	5.370	0.2247	0.0649	90.895	None	None?	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates in strong traces.
198 Lager	1014.88	1.392	4.470	0.2864	0.0903	94.138	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0184, sulphates in strong traces.
199 Lager	1012.73	6.614	6.226	0.2938	0.1052	87.160	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, per cent, sulphates none, a good sample of beer.
200 Lager	1017.50	3.842	6.311	0.2045	0.0777	89.847	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0069, sulphates in traces present.
201 Lager	1013.08	4.120	5.305	0.297	0.10426	90.575	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, per cent, sulphates a very faint trace.
202 Lager	1027.44	2.635	8.144	0.193	0.0824	89.221	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0068, sulphates in traces, a good sample of beer.
203 Lager	1019.06	3.370	6.432	0.2657	0.0966	90.198	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates absent, a good sample of beer.
204 Lager	1017.88	3.799	6.334	0.2808	0.1113	89.667	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0230, sulphates in traces, a sample of good beer.
205 Lager	1005.73	3.518	3.098	0.376	0.118	93.384	None	None	Ash white, no excess of carbonates or sulphates, but some chlorides.
206 Ale	1017.02	3.724	6.073	0.234	0.0581	90.203	None	To some extent	Ash white, carbonates not in excess, but sulphates and chlorides very strong traces indeed.
207 Porter	1033.63	3.731	11.783	0.386	0.0697 !	84.483	None	Yes	Ash white, no excess of carbonates, sulphates strong, chlorides very strong.
208 Ale	1010.04	3.564	4.120	0.294	0.0424 !	92.316	None	Yes	Ash white, carbonates none, sulphates strong traces, chlorides strong traces.
209 Ale	1024.76	3.725	7.923	0.327	0.0733	88.352	None	Yes	Ash white, no excess of carbonates, sulphates very strong traces, beer appears to be salted.
210 Ale	1005.12	5.894	3.960	0.2925	0.0617	90.146	None	Yes	Ash white, no excess of carbonates, sulphates strong traces, beer is salted and rather sour.
211 Ale	1024.63	3.617	7.864	0.332	0.0754	88.529	None	Some used apparently	Ash white, no excess of carbonates, sulphates very strong traces, chlorides heavy, beer is salted.

216 Porter	1010.65	5.406	5.239	0.391	0.1223	89.355	None	None	Ash white, no excess of carbonates, sulphates slight traces, chlorine as salt calculated, 0.0255.
217 Ale	1007.39	5.017	4.187	0.386	0.109	90.796	None	None	Ash white, no excess of carbonates, sulphates traces, chlorine as salt calculated, 0.1093, beer is salted, taste somewhat sour.
218 Ale	1009.91	3.784	4.284	0.278	0.0538	91.932	None	Yes	Ash white, carbonates not in excess, sulphates very strong traces, beer is salted. The beer was in my opinion unfit to drink.
219 Lager	1015.11	3.361	5.454	0.261	0.0765	91.195	None	None	Ash white, no excess of carbonates, sulphates very heavy traces, beer is salted.
220 Ale	1027.05	3.059	8.153	0.321	0.0477 !	88.788	None	To a great extent	Ash white, no excess of carbonates, sulphates in strong traces, chlorides heavy.
221 Ale	1005.75	5.557	3.990	0.400	0.1195	88.453	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorin as salt calculated, 0.0221, beer is slightly sour.
222 Ale	1015.27	4.868	5.885	0.302	0.099	89.247	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.0414.
223 Porter	1010.85	5.962	5.509	0.311	0.138	86.529	None	None	Ash white, no excess of carbonates, sulphates present in strong traces, chlorine calculated as salt, 0.0603. Beer too sour for my taste. This beer has a remarkable amount of phosphoric acid as compared to the ash, it seems almost as if the phosphoric acid has been added. Will be examined again carefully in this regard.
224 Porter	1023.45	4.313	7.869	0.359	0.0833	87.818	None	Used to some extent, apparently	Ash white, carbonates not in excess, sulphates present in very strong traces, chlorine calculated as salt 0.0662, beer has a sour taste.
225 Ale	1033.75	2.469	9.501	0.4229	0.0687	88.030	None	Yes	Ash white, no excess of carbonates, very strong traces of sulphates, chlorine as salt calculated, 0.0749. A young beer.
226 Ale	1033.54	2.427	9.456	0.328	0.0729	88.117	None	None	Ash white, no carbonates in excess, sulphates in very strong traces, chlorine as salt calculated, 0.1180, beer is salted. A very young beer.
227 Ale	1012.63	3.312	4.811	0.226	0.0541	91.877	None	To some extent	Ash white, carbonates not in excess, sulphates present in strong traces, chlorine calculated as salt, 0.01157, a fair sample.
228 Lager	1014.27	3.241	5.192	0.249	0.0622	91.567	None	None	Ash white, no carbonates in excess, sulphates strong traces, chlorine calculated as salt, 0.0161. Beer was slightly sour.
229 Lager	1012.89	3.707	5.061	0.2533	0.0738	91.232	None	If, to a very small extent	Ash is white, carbonates none in excess, of sulphates strong traces, chlorine calculated as salt, 0.0127.
230 Porter	1010.08	4.361	4.590	0.3439	0.0928	91.029	None found.	Apparently none used	Ash white, no carbonates to excess, beer is salted, taste strong sour.
231 Lager	1015.39	3.795	5.684	0.2602	0 0760	90.521	None found.	None found	Ash white, no excess of carbonates or salt.
232 Ale	1003.11	6.546	3.705	0 347	0.097	89.749	None found.	Questionable	Ash white, no carbonates to excess, beer is salted.
233 Ale	1011.98	5.631	5.667	0.283	0.0809	88.702	None found.	None	Ash white, no carbonates present in excess, but the beer is salted.
234 Ale	1016.65	4.195	6.175	0.281	0.0714	89.630	None found.	None apparently	Ash white, no carbonates in excess, but salt seems to have been added.
235 Ale	1006.89	3.979	3.588	0.2498	0.0666	92.433	None found.	Questionable	Ash white, no carbonates in excess, beer is salted.
236 Ale	1013.00	3.170	4.844	0.2823	0.0738	91.986	None	Questionable	Ash white, no carbonates present, beer is salted.
237 Ale	1019.08	3.213	6.292	0.311	0.0666	90.495	None	Very likely	Ash white, carbonates not in excess, salt added apparently.
237 Ale	1018.63	3.211	6.193	0.263	0.0676	90.596			By mistake I opened the other bottle and made the second analysis, not knowing that one had been made some weeks previous.
238 Lager	1024.81	3.124	7.695	0.268	0.0866	89.181	None	None	Ash white, no carbonates in excess, no salt added.
239 Lager	1013.71	3.918	5.332	0.271	0.096	90.750	None	None	Ash white, carbonates not in excess, apparently not salted.
240 Lager	1012.98	3.932	5.179	0.251	0.104	90.889	None	None	Ash white, carbonates not in excess, no salt added.
241 Ale	1014.70	4.345	5.785	0.311	0.0817	89.870	None	None	Ash white, carbonates none in excess, beer appears to be salted.
242 Ale	1014.70	5.427	6.213	0.367	0.0756	88.360	None	Apparently used	Ash white, no excess of carbonates, beer is salted.
243 Ale	1008.76	4.820	4.467	0.293	0.0952	90.718	None	None	Ash white, no excess of carbonates, beer is salted apparently.
244 Ale	1010.19	4.775	5.149	0.309	0.106	90.076	None	None	Ash white, carbonates not in excess, beer is salted.
245 Porter	1014.88	4.927	6.061	0.316	0.0986	89.022	None	None	Ash white, carbonates not in excess, beer is salted.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
246 Ale	1020.13	2.864	6.430	0.199	0.073	90.706	None	Questionable	Ash white, no excess of carbonates, beer is salted; a young beer, ash rather small in quantity but phosphoric acid corresponding to ash, the use of a malt substitute most likely.
247 Porter	1007.70	5.076	4.275	0.256	0.105	90.649	None	None	Ash white, no excess of carbonates, beer is not salted.
248 Ale	999.44	5.814	2.462	0.239	0.080	91.721	None	Apparently none	Ash white, no excess of carbonates, salt added to the beer; beer was very sour, must be very old or has suffered since leaving the brewery.
249 Ale	1013.56	4.267	5.510	0.235	0.0577	90.223	None	Apparently used	Ash white, no excess of carbonates, beer is salted.
250 Lager	1016.51	3.965	6,032	0.234	0.0613	90.003	None	None	Ash white, no excess of carbonates, no salt used in this beer.
251 Lager	1015.72	4.094	4.929	0.221	0.108	90.977	None	None	Ash white, no excess of carbonates, no salt present in the beer.
252 Ale	1010.97	3.061	4.231	0.259	0.046	92.708	None	Most likely	Ash white, no excess of carbonates, beer is salted, beer, when examined, was not good, being strongly acid.
253 Lager	1014.02	4.515	5.658	0.281	0.114	89.827	None	None	Ash white, no excess of carbonates and no salt present.
254 Ale	1014.70	3.536	5.417	0.212	0.0711	91.047	None	None	Ash white, no excess of carbonates, not salted.
255 Ale	1014.28	3.489	5.358	0.212	0.068	91.153	None	None	Ash white, no excess of carbonates, no salt added.
256 Ale	1009.62	4.499	4.554	0.305	0.0777	90.947	None	Questionable	Ash white, no excess of carbonates, beer is salted.
257 Porter	1012.47	4.716	5.439	0.405	0.0644	89.845	None	Yes, apparently	Ash white, no excess of carbonates, beer is salted.
258 Ale	1015.29	4.438	5.948	0.329	0.0933	89.614	None	None	Ash white, carbonates not in excess, beer is salted.
259 Ale	1016.93	6.308	4.325	0.291	0.091	89.367	None	None	Ash white, no excess of carbonates, beer is salted.
260 Ale	1006.85	6.103	4 499	0.383	0.0737	89.498	None	Apparently used	Ash white, no excess of carbonates, but salt used.
261 Lager	1018.25	3.748	6.412	0.304	0.1054	89.840	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0115 per cent.
262 Lager	1016.89	4.597	6.443	0.3096	0.1019	88.960	None	None	Ash white, no excess of carbonates, sulphates none, chlorine calculated as salt, 0.023 per cent. A very good beer.
263 Lager	1013.54	3.634	5.231	0.2749	0.1026	91.135	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0278. A good sample of beer.
264 Lager	1024.14	2.633	7.376	0.285	0.08818	89.991	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0183 per cent.
265 Lager	1019.64	2.861	6.340	0.2593	0.0757	90.799	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0229. A very good sample of beer.
266 Lager	1020.68	3.005	6.786	0,224	0.0842	90.209	None	None	Ash white, carbonates not in excess, sulphates in traces, chlorine calculated as salt, 0.0091. A good sample of beer.
267 Ale	1003.46	5.057	3.181	0.335	0.08133	91.762	None	Apparently	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0350 per cent. Beer sour, unfit to drink.
268 Ale	1016.25	3.557	5.825	0.3023	0.112	90.618	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0253 per cent.
269 Porter	1024.36	3.583	7.771	0.3303	0.1134	88.646	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.03893 per cent.
270 Lager	1012.50	4.211	5.197	0.312	0.1107	90.592	None	None	Ash white, no excess of carbonates, sulphates traces, chlorine calculated as salt, 0.0185 per cent.
271 Lager	1020.64	1.280	5.911	0.308	0.111	92.829	None	None	Ash white, no excess of carbonates, sulphates, traces, chlorine calculated as salt, 0.0184. Although a young and light beer it was a good sample.
272 Lager	1010,03	3.730	4.318	0.266	0.0893	91.955	None	None	Ash white, no excess of carbonates, sulphates some traces, chlorine calculated as salt, 0.03349 per cent. Taste good, a very good sample.
273 Lager	1024.72	[illegible]	[illegible]	0.287	0.06428	89.719	None	None ?	Ash white, no excess of carbonates, sulphates heavy traces, chlorine calculated as salt, 0.04666 per cent.

274 Lager ...	1017.64	3.446	6.077	0.265	0.0966	90.577	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0160 per cent, fair sample of beer.
275 Lager ...	1008.77	3.586	3.918	0.2638	0.06572	92.496	None	Questionable	Ash white, no excess of carbonates, sulphates in strong traces, chlorine as salt, 0.01837 per cent, beer had a sour taste.
276 Lager ...	1013.20	4.006	5.277	0.2662	0.07093	90.717	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0115 per cent.
277 Porter .	1018.84	4.780	7.136	0.4401	0.0983	88.084	None	Yes.............................	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0392.
278 Ale	1018.00	4.188	6.537	0.3702	0.0806	89.275	None	Yes.............................	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0459.
279 Ale	1005.11	5.316	3.727	0.314	0.06957	90.957	None	Yes.............................	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0328 per cent, sour very decidedly in taste.
280 Ale	1012.13	4.840	5.368	0.3351	0.07598	89.792	None	Apparently.............	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.06487, taste slightly sour.
281 Porter .	1009.47	4.888	4.687	0.407	0.05989	90.425	None	Yes.............................	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.09523 per cent, decidely sour taste.
282 Ale	1017.51	3.069	5.919	0.272	0.0760	91.012	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0506 per cent.
283 Porter .	1019.32	2.995	6.321	0.345	0.06559	90.684	None	Apparently used	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0943 per cent.
284 Ale	1018.54	5.067	4.769	0.403	0.07856	90.164	None	None	Ash white, carbonates not in excess, sulphates very strong traces, chlorine caldulated as salt, 0.1554 per cent, taste slightly sour.
285 Lager ...	1010.53	4.386	4.745	0.298	0.08356	90.869	None	None	Ash white, no excess of carbonates, sulphates very strong traces indeed, chlorine calculated as salt, 0.03243 per cent.
286 Ale	1008.29	4.938	6.216	0.3116	0.1177	88.846	None	None	Ash white, no excess of carbonates, no salt used.
287 Lager ...	1008.31	3.971	4.015	0.251	0.076	92.014	None	None	Ash white, no excess of carbonates but beer is salted.
288 Ale	1008.78	3.118	3.701	0.272	0.0785	93.181	None	Doubtful	Ash of the beer white, carbonates not in excess, no salt used.
289 Lager ...	1037.00	0.9625	9.6470	0.2872	0.0933	89.4905	None	None	Ash white, no excess of carbonates, sulphate traces, salt calculated from chlorine 0.0022 per cent, beer not salted, a very young beer, unfit to drink in the state it was in when opening the bottle.
290 Lager ..	1010.22	3.331	4.165	0.278	0.101	92.504	None	None	Ash white, no carbonates used, sulphates in traces, chlorine calculated as salt, 0.0067.
291 Ale	1006.52	4.904	3.898	0.353	0.0723	91.198	None	Apparently.............	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0907, beer is salted.
292 Ale	1002.98	4.265	2.703	0.3108	0.0904	93.032	None	None	Ash white, no excess of carbonate, traces of sulphates, chorine found corresponding to 0.0233 per cent, beer is salted apparently.
293 Porter ..	1011.639	3.719	4.733	0.335	0.0905	91.548	None	None	Ash white, no excess of carbonates, sulphates in strong traces, beer is salted, chlorine calculated as salt, 0.106 per cent.
294 Ale	1009.08	3.791	4.085	0.241	0.0709	92.124	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.086, beer is salted.
295 Ale	1010.98	4.562	4.647	0.228	0.0509	90.791	None	Apparently.............	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.044, beer is salted.
296 Ale	1012.98	3.821	5.141	0.209	0.0566	91.038	None	Questionable............	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt, 0.037, beer is salted.
297 Ale	1004.35	5.401	3.565	0.552	0.0661	91.0310	None	Not very doubtful......	Ash white, no excess of carbonates, sulphates very heavy, very heavily salted, the chlorine found corresponds to 0.338 per cent, shall repeat tests.
298 Ale	1011.55	3.640	4.927	0.302	0.0747	91.433	None	None	Ash white, no excess of carbonates, sulphates heavy, chlorine as salt calculated 0.0673 per cent, beer is salted.
299 Ale	1009.86	4.565	4.648	0.298	0.0628	90.787	None	Apparently................	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0245 per cent, beer is salted or the water used contained much chlorine.
300 Porter .	1010.32	3.894	4.459	0.343	0.0806	91.647	None	None apparently.......	Ash white, no excess of carbonates, sulphates heavy, beer is salted.
301 Ale	1007.05	4.597	3.880	0.374	0.0643	91.523	None	Apparently (phosphoric acid too low for ash.)................	Ash white, no excess of carbonates, sulphates heavy, beer is salted.
302 Ale	1010.45	4.011	4.538	0.3036	0.0581	91.451	None	Yes, the phosphoric acid is much too low for ash	Ash white, no excess of carbonates, sulphates very strong traces, beer is salted.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
303 Ale	1012.239	4.355	5.173	0.311	0.0705	90.472	None	Apparently used.......	Ash white, no excess of carbonates, sulphates heavy, beer is salted.
304 Lager...	1019.42	3.436	6.563	0.247	0.0977	90.001	None	None	Ash white, no excess of carbonates, sulphates or chlorides, not salted.
305 Lager ...	1018.20	3.387	6.270	0.2409	0.0805	90.343	None	None	Ash white, no excess of carbonates, chlorine in strong traces, the same holds good in regard to sulphates.
306 Ale	1013.469	3.366	5.065	0.228	0.0621	91.569	None	Questionable	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0323 per cent.
307 Ale	1010.87	3.491	4.403	0.241	0.0475	92.106	None	Apparently used.......	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0116 per cent, beer is salted.
308 Ale	1004.37	4.431	3.146	0.339	0.0797	92.423	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine found corresponds to salt, 0.0838, beer is salted.
309 Porter .	1012.80	4.419	5.338	0.332	0.0847	90.243	None	None apparently.......	Ash white, no excess of carbonates, chlorine found calculated as salt, 0.0694 per cent, beer slightly sour, salted, sulphates in traces.
310 Ale	1010.39	5.889	5.363	0.2219	0.0457	85.748	None	Unquestionably ash too low for extract and alcohol............	Ash white, no carbonates in excess, salt calculated from chlorine found, 0.0556 per cent, sulphates in traces.
311 Porter..	1011.57	4.5103	5.1103	0.170	0.0815	90.3794	None	None	Ash white, no excess of carbonates, sulphates absent, salt only in traces.
312 Lager....	1022.53	3.638	7.413	0.2521	0.0997	88.949	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0045 per cent.
313 Weiss...	1012.05	1.265	3.692	0.315	0.0659	95.043	None	None	Ash white, no excess of carbonates, heavy traces of sulphates, chlorine calculated as salt, 0.0554 per cent, a kind of Weiss beer, slightly sour.
314 Weiss...	1003.40	2.004	1.799	0.0976	0.C3317	96.197	None	None	Ash white, no excess of carbonates, sulphates in traces, salt none, a kind of Weiss beer, beer is somewhat sour.
315 Weiss...	1003.54	3.002	2.311	0,129	0.0421	94.687	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0023, a kind of Weiss beer.
316 Lager....	1011.77	3.553	4.659	0.274	0.097	91.788	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0092.
317 Lager....	1016.85	5.728	6.955	0.216	0.0859	87.317	None	None	Ash white, no excess of carbonates, sulphates in very slight traces, chlorine faint trace.
318 Lager....	1014.26	4.119	5.605	0.262	0.0950	90.276	None	None	Ash white, no excess of carbonates, sulphates in very faint traces, chlorine calculated as salt, 0.0046.
319 Ale	1024.14	3.147	7.569	0.297	0.0922	89.284	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0256 per cent.
320 Porter ..	1026.04	3.890	8.340	0.325	0.08306	87.770	None	None ?........	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.045 per cent.
321 Lager. ..	1012.83	4.069	4.935	0.209	0.08139	90.996	None	None	Ash white, no excess of carbonates, no sulphates present, salt in traces, somewhat pitchy taste.
322 Lager....	1014.65	3.505	5.479	0.233	0.08616	91.016	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0234 per cent.
323 Lager...	1018.81	3.828	6.584	0.216	0.C926	89.588	None	None	Ash white, no excess of carbonates, no sulphates, salt in traces, 0.0023 per cent, beer has a somewhat pitchy taste, otherwise very good.
324 Lager...	1016.55	4.040	5.864	0.214	0.0869	90.096	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0023 per cent.
325 Lager...	1018.19	4.446	6.737	0.1987	0.0912	88.817	None	None	Ash white, no excess of carbonates, sulphates, none present, chlorine a trace. A fine sample of beer.

326 Porter..	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0046 per cent, sulphates strong traces.
327 Ale	1016.44	5.471	6.724	0.286	0.1153	87.800	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0046 per cent, sulphates in traces.
328 Ale	1003.97	6.135	3.777	0.263	0.116	90.088	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.035 per cent, traces of sulphates
329 Porter ..	1018.92	3.781	6.606	0.2925	0.0823	89.613	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0391 per cent, sulphates in strong traces.
330 Ale	1018.17	4.437	6.711	0.298	0.1016	88.852	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0368 per cent, of sulphates strong traces.
331 Porter ..	1018.92	2.782	6.142	0.452	0.0816	91.076	None	None?..........................	Ash white, no excess of carbonates, chlorides determined as salt, 0.1314 per cent, heavily salted beer, sulphates very strong traces
332 Ale	1022.02	2.700	6.878	0.2393	0.07165	90.422	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0228 per cent, sulphates strong traces,
333 Porter .	1022.62	3.993	7.479	0.307	0.118	88.528	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.064, strong traces of sulphates.
334 Lager...	1022.55	3.934	7.469	0.2173	0.090	88.597	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0343 per cent, sulphates in traces. Fine sample of beer.
335 Lager...	1017.55	3.815	6.259	0.248	0.1149	89.896	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, sulphates none. Very fine sample, has a slightly pitch taste.
336 Ale	1014.88	6.439	6.721	0.3197	0.1285	86.840	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0023, sulphates not present.
337 Lager...	1018.96	3.280	6.385	0.282	0.0999	90.335	None	None	Ash white, no excess of carbonates, chlorine as salt calculated, 0.0023 per cent, sulphates none. Taste somewhat pitchy.
338 Lager...	1018.17	3.685	6.346	0.2407	0.0907	89.969	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0091, sulphates not present. Fine sample of beer.
339 Lager...	1022.27	3.190	7.243	0.215	0.0887	89.567	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, no sulphates present.
340 Lager...	1017.68	3.897	6.322	0.249	0.0737	89.781	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, no sulphates present. Fine sample of beer.
341 Lager...	1018.03	2.359	6.196	0.2252	0.0971	92.445	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023 per cent, sulphates none. Fine sample, taste somewhat pitchy.
342 Lager...	1015.64	4.077	5.891	0.1856	0.0836	90.0032	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates none. Fine sample of beer.
343 Weiss...	1005.70	0.889	2.767	0.115	0.0413	96.344	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.037, sulphates in traces. Is a kind of Weiss beer.
344 Lager...	1020.43	3.564	6.876	0.213	0.0835	89.560	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, no sulphates. Good sample of beer.
345 Lager...	1017.53	4.181	6.467	0.250	0.1012	89.352	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0115, sulphates in very strong traces.
346 Lager...	1014.56	3.617	5.444	0.1831	0.0754	90.939	None	None	Ash white, no carbonates in excess, chlorine calculated as salt, 0.0023 sulphates none.
347 Lager...	1019.58	3.382	6.577	0.2809	0.1117	90.041	None	None	Ash white, no excess of carbonates chlorine only a trace, no sulphates.
348 Weiss...	1005.88	1.611	2.262	0.263	0.0476	96.127	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1676 per cent, beer heavily salted. A kind of Weiss beer.
349 Weiss...	1005.65	1.926	2.341	0.161	0.0746	95.733	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0325, sulphates in traces. A kind of Weiss beer.
350 Ale	1010.18	4.125	4.534	0.227	0.0696	91.341	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0116, sulphates present in strong traces.
351 Lager...	1016.94	4.147	6.242	0.412	0.0853	89.611	None	Yes	Ash of the beer white, no excess of carbonates, sulphates a very considerable quantity, chlorine calculated as salt, 0.0156 per cent.
352 Ale	1009.63	5.579	5.051	0.357	0.09381	89.370	None	None	A good tasting beer. Ash white, no excess of carbonates, sulphates considerable, chlorine calculated as salt, 0.0785 per cent.
353 Ale	1015.56	4.205	5.894	0.3621	0.0840	89.901	None	Questionable	Ash white, no excess of carbonates, sulphates very considerable, chlorine calculated as salt, 0.0575 per cent.
354 Ale	1015.42	3.954	5.757	0.3451	0.0826	90.289	None	None	Ash white, no excess of carbonates, sulphates in considerable quantity, chlorine as salt calculated, 0.0576.
355 Porter ..	1008.91	5.657	4.885	0.470	0.1140	89.458	None	None	Ash white, no excess of carbonates, sulphates considerable, chlorine calculated as salt, 0.0789 per cent.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
356 Lager...	1022.25	3.474	7.325	0.2016	0.08116	89.101	None	None? May be so-called rice beer	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0114. An excellent beer in appearance and taste.
357 Porter.	1015.46	4.524	6.039	0.313	0.0828	89.437	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0368.
358 Lager...	1016.09	5.582	6.661	0.2383	0.06266	87.757	None	Yes	Ash and phosphoric acid in too small quantities as compared to alcohol and extract. Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0115.
359 Ale	1015.31	4.019	5.829	0.3144	0.09264	90.152	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0184 per cent.
360 Weiss...	1012.74	1.943	4.143	0.340	0.03057	93.914	None	Questionable	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.226, heavily salted. Kind of small or Weiss.
361 Lager ..	1010.14	4.369	4.609	0.2351	0.0508	91.022	None	Questionable	Ash white, no excess of carbonates, sulphates a considerable quantity, salt calculated from chlorine, 0.0046.
362 Ale	1019.16	2.708	6.102	0.2832	0.0805	91.190	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0805. A very young beer.
363 Lager...	1019.31	3.376	6.493	0.354	0.0678	90.131	None	Yes?	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0734.
364 Ale	1007.52	3.288	3.455	0.223	0.0662	93.257	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.06051 per cent.
365 Ale	1009.06	3.381	3.918	0.1991	0.0690	92.701	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0533.
366 Ale	1011.88	3.588	4.715	0.2022	0.06067	91.697	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0370 per cent.
367 Lager...	1007.11	3.956	3.655	0.1994	0.0669	92.380	None	None	Ash white, no excess of carbonates, sulphates considerable traces, chlorine calculated as salt, 0.0325.
368 Lager...	1007.09	4.240	3.753	0.1740	0.069	92.007	None	None	Ash white, no excess of carbonates, sulphates none but a mere trace, chlorine calculated as salt, 0.0069.
369 Ale	1013.62	3.523	5.172	0.1976	0.06069	91.305	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0185.
370 Ale	1009.52	7.679 !	5.829	0.2629	0.0805	86.492	None	None?	Ash white, no excess of carbonates, sulphates very considerable, chlorine calculated as salt, 0.0232. Beer is slightly sour.
371 Ale	1014.27	3.865	5.478	0.2132	0.0573	90.657	None	None apparently........	Ash white, no excess of carbonates, sulphates strong traces, chlorine as salt calculated, 0.0103.
372 Lager...	1015.36	1.583	4.686	0.3438	0.0887	93.731	None	None	Ash white, no excess of carbonates, sulphates in considerable quantities, chlorine calculated as salt, 0.0415. Apparently Weiss or light and young.
373 Ale	1009.51	3.9705	4.2878	0.2281	0.0660	91.7417	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0116.
374 Ale	1007.72	5.4102	4.456	0.3257	0.0932	90.134	None	None	Ash white, no carbonates, no sulphates, chlorine calcu'ted as salt, 0.0442.
375 Ale	1006.10	3.083	2.998	0.471	0.097	93.919	None	Yes.....................	Remarkable for large amount of ash and phosphoric acid in comparison to alcohol and extract, one bottle entirely spoiled, beer in other rather sour. Ash white, no excess of carbonates, sulphates very considerable

						......	None	Yes	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0672, sulphates considerable. Beer is sour.
....	1005.38	4.381	3.399	0.5179	0.10077	92.220	None	Yes	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0839 per cent, sulphates very strong traces indeed, a very light beer for porter. Taste sour.
379 Lager...	1022.20	2.934	7.082	0.372	0.0533	89.984	None	Yes	Ash white, no excess of carbonates, chlorine calculated as salt, 0.03437, sulphates very strong traces indeed.
380 Ale	1010.39	4.344	4.685	0.394	0.07305	90.871	None	Yes.	Ash white, no excess of carbonates, chlorine as salt calculated, 0.06264, sulphates very heavy traces indeed.
381 Lager...	1011.28	4.402	4.957	0.2294	0.07143	90.641	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.00493, sulphates none.
382 Porter..	1011.90	6.695	6.044	0.426	0.1085	87.261	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.07646 per cent, sulphates in very strong traces.
383 Ale	1019.96	5.111	7.442	0.309	0.05476	87.447	None	Yes	Ash and phosphoric acid in too small quantities as compared with extract and alcohol. Ash white, no excess of carbonates, chlorine calculated as salt, 0.05476, sulphates strong traces.
384 Ale	1013.81	2.963	4.986	0.278	0.0596	92.051	None	None ?	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0889.
385 Lager...	1007.99	5.026	4.350	0.282	0.09829	90.624	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0023, sulphates none.
386 Lager...	1019.76	3.721	6.795	0.2304	0.06731	89.484	None	Questionable	Ash white, no excess of carbonates, chlorides calculated as salt, 0.00229, sulphates strong traces.
387 Ale	1011.29	4.367	4.899	0.2699	0.0867	90.734	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.05553 per cent, sulphates strong traces.
388 Porter.	1006.89	4.924	4.021	0.3081	0.1028	91.055	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.02791, very strong traces of sulphates. Too sour and mouldy to be drunk.
389 Ale	1008.99	8.193	5.894	0.303	0.07714	85.913	None	Yes	Ash much less than the alcohol and extract would allow us to suppose, same in regard to phosphoric acid. Ash white, no excess of carbonates, chlorine calculated as salt, 0.0438, sulphates consid'able quantity
390 Lager...	1013.98	3.910	5.443	0.2389	....	90.647	None	Doubtful	Ash white, no excess of carbonates, chlorine calculated as salt, 0.01848, traces of sulphates.
391 Ale	1004.74	5.761	3.823	0.3475	0.0887	90.416	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.07224, sulphates present in very strong traces.
392 Porter.	1011.99	4.423	5.160	0.3967	0.1163	90.417	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0716, sulphates very strong traces, taste of beer rather sour.
393 Ale	1011.00	5.542	5.385	0.3397	0.09524	89.073	None	None	Ash white, carbonates not in excess, chlorine calculated as salt, 0.0579, sulphates in strong traces.
394 Ale	1016.32	4.725	6.141	0.3883	0.1031	89.134	None	None	Ash white, no excess of carbonates, chlorides calculated as salt, 0.0609, sulphates very strong traces.
395 Porter.	1026.55	4.615	8.922	0.5484	0.1139	86.263	None	None ?	Ash white, no excess of carbonates, chlorine calculated as salt, 0.1414, sulphates very strong traces, beer has a sour taste.
396 Ale	1012.489	3.686	4.937	0.268	0.08077	91.377	None	None	Ash white, carbonates not in excess, chlorine calculated as salt, 0.0393, sulphates strong traces.
397 Ale	1016.07	4.049	5.999	0.4063	0.0817	89.952	None	Questionable	Ash white, no excess of carbonate, chlorine calculated as salt, 0.1244, sulphates strong traces.
398 Lager...	1020.88	4.151	7.263	0.3024	0.1026	88.586	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.00229.
399 Lager...	1025.06	3.373	7.955	0.2523	0.0865	88.672	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0034, sulphates none. Fair sample of good beer.
400 Ale	1014.11	4.311	5.631	0.2445	0.08273	90.358	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0415, sulphates strong traces.
401 Ale	1006.42	5.282	4.056	0.3176	0.1125	90.662	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0232 per cent.
402 Porter..	1026.98	3.092	8.184	0.309	0.10182	88.724	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.03416 per cent.
403 Ale	1022.43	6.756	8,651	0.511	0.1661	84.593	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.04348 per cent. A very strong and heavy beer.
404 Ale	1019.98	4.098	7.024	0.236	0.09217	88.878	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0183 per cent.
405 Ale	1016.40	4.435	5.985	0.2244	0.0780	89.590	None	None	Ash white, no excess of carbonates, sulphates strong traces, calculated as salt, 0.02073 per cent.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
406 Ale	1002.10	5.394	2.976	0.290	0.1227	91.630	None	None	Ash white, no excess of carbonates, sulphates none, chlorine calculated as salt, 0.02106.
407 Lager ...	1014.28	3.194	5.190	0.2906	0.09268	91.616	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0138 per cent.
408 Lager ..	1017.67	3.056	5.932	0.2301	0.0794	91.012	None	None	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.023. A very good sample of beer.
409 Lager ..	1011.76	4.612	5.177	0.2419	0.08151	90.211	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0463 per cent.
410 Lager ...	1015.41	4.659	6.101	0.309	0.1063	89.240	None	None	Ash white, carbonates not in excess, sulphates in strong traces, chlorine calculated as salt, 0.0092 per cent.
411 Lager...	1017.97	4.004	6.457	0.2557	0.9385	89.539	None	None	Ash white, no excess of carbonates, sulphates in very slight traces, chlorine calculated as salt, 0.0506 per cent.
412 Ale	1010.69	3.381	4.318	0.2469	0.06085	92.301	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0510 per cent.
413 Lager...	1016.20	4.2104	6.0608	0.3207	0.10313	89.7288	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.009209 per cent.
414 Lager...	1019.21	3.260	6.431	0.316	0.0856	90.309	None	None?........................	Ash white, no excess of carbonates, sulphates very heavy traces indeed, chlorine calculated as salt, 0.0229 per cent.
415 Lager...	1011.45	4.344	4.978	0.206	0.0716	90.678	None	None	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0092 per cent. A very fine sample of beer.
416 Lager...	1011.54	7,061	6.091	0.3498	0.08953	86.848	None	Yes.......................	Ash white, no excess of carbonates, sulphates very strong traces, chlorine calculated as salt, 0.0162 per cent.
417 Ale	1009.29	3.392	3.962	0.2334	0.0624	92.646	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.04407 per cent.
418 Porter.	1013.41	3.684	5.192	0.2430	0.06167	91.124	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0300 per cent.
419 Lager..	1011.64	3.410	4.588	0.266	0.0886	92.002	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0278 per cent.
420 Ale	1015.64	4.997	6.293	0.308	0.0963	88.710	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.0253 per cent.
421 Porter..	1016.58	3.553	6.151	0.2631	0.08685	90.296	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.02305 per cent.
422 Ale	1019.94	3.790	6.835	0.2702	0.06971	89.375	None	Apparently none.......	Ash white, no excess of carbonates, sulphates in very strong traces, chlorine calculated as salt, 0.0206 per cent.
423 Ale	1026.38	3.208	8.077	0.2903	0.06739	88.715	None	None, probably..........	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.04339 per cent.
424 Ale	1005.99	6.257	4.344	0.347	0.08477	89.399	None	None?........................	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.0652 per cent.
425 Ale	1020.98	7,304	8.527	0.51081	0.14255	84.169	None	None	Ash white, no excess of carbonates, sulphates strong traces, chlorine calculated as salt, 0.05735 per cent. A remarkably strong, heavy beer.
426 Weiss...	1001.83	1.695	1.277	0.126	0.0311	97.028	None	None	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0443 per cent. Should not be called beer.
427 Porter.	1010.38	5.882	5.375	0.543	0.1161	88.743	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0975 per cent. Beer somewhat sour.
428 Weiss...	1002.46	1.355	1.264	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Ash white, no excess of carbonates, sulphates in traces, chlorine calcu-

429 Lager ..	1016.93	3.887	6.124	0.303	0.0818	89.989	None	None	A very fine glass of beer. Ash white, no carbonates in excess, salt only in traces, no sulphates.
430 Ale	1014.92	4.219	6.831	0.238	0.0818	89.850	None	None	Ash white, no excess of carbonates, sulphates very strong, chlorine calculated as salt, 0.03 per cent.
431 Porter ..	1013.58	4.446	5.551	0.309	0.0747	90.003	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, equal to 0.161 per cent. Beer is not sour (heavy salted).
432 Ale	1015.76	4.271	6.014	0.292	0.0641	89.715	None	None	Ash white, no carbonates in excess, sulphates very heavy, chlorine calculated as salt, 0.076 per cent. Beer is not sour
433 Porter ..	1022.37	3.783	7.450	0.371	0.0785	88.767	None	None	Ash white, no excess of carbonates, sulphates rather heavy, chlorine calculated as salt, 0.135 per cent (heavy salted). Has slight sour taste.
434 Lager....	1012.83	2.670	4.554	0.206	0.0723	92.776	None	None	A very light beer (perhaps so-called present-use beer), taste slightly sour. Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, equal to 0.0069.
435 Lager....	1022.32	3.424	7.401	0.256	0.1026	89.175	None	None	Ash white, no excess of carbonates, no sulphates, chlorine calculated as salt, 0.0068 per cent. Beer has a fair taste, is not sour.
436 Lager ...	1018.75	1.584	5.537	0.172	0.0671	92.879	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0045 per cent.
437 Lager....	1015.22	2.825	5.255	0.204	0.084	91.920	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, equal to 0.004 per cent. Beer has a pitchy taste.
438 Porter ..	1009.49	5.671	5.044	0.350	0.1038	89.285	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0347 per cent. This porter is rather sour in taste.
439 Lager ..	1017.21	3.554	6.066	0.241	0.0866	90.380	None	None	Ash white, no excess of carbonates, chlorine in traces, no sulphates.
440 Lager....	1016.41	4.242	6.163	0.237	0.0938	89.595	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine calculated as salt, 0.0045 per cent.
441 Lager....	1018.16	3.944	6.472	0.240	0.0958	89.584	None	None	Ash white, no carbonates in excess, no sulphates, chlorine calculated as salt, 0.004 per cent.
442 Weiss....	1004.01	0.964	1.407	0.096	0.0264	98.495	None	None	Ash white, no carbonates in excess, sulphates very heavy, chlorine calculated as salt, 0.0104 per cent. This should not be called beer. Taste sour, but not excessive.
443 Lager ...	1015.16	3.999	5.750	0.234	0.0865	90.251	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.0046 per cent.
444 Lager ..	1017.47	3.140	5.935	0.2249	0.0852	90.925	None	None	Ash white, no excess of carbonates, no sulphates, chlorine but in traces.
445 Lager....	1017.59	2.945	5.882	0.232	0.0936	91.173	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine only in traces.
446 Lager ...	1022.01	2.922	7.001	0.2701	0.0959	90.078	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, equal to 0.0091 per cent.
447 Ale	1019.46	5.130	7.323	0.270	0.0893	87.547	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0229 per cent. Beer is not sour.
448 Lager ..	1017.26	3.146	5.978	0.278	0.0866	90.876	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.016 per cent. Beer has a fair taste and is not sour.
449 Lager....	1013.19	4.791	5.193	0.262	0.0777	90.016	None	None	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0115 per cent.
450 Lager ..	1015.01	3.397	5.423	0.246	0.0704	91.180	None	None	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0184 per cent.
451 Lager....	1018.15	3.728	6.361	0.249	0.0673	89.911	None	None	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0112 per cent.
452 Lager ...	1014.44	3.006	5.1205	0.3024	0.0655	91.874	None	Apparently	Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.02077. This sample of beer, though a late one, was too sour to drink.
453 Lager ..	1013.52	6.972	6.459	0.293	0.0632	89.569	None	Yes, hardly doubtful.	Ash white, no excess of carbonates, sulphates considerable, chlorine calculated as salt, 0.0208. Phosphoric acid very low as compared to the total ash.
454 Ale*	1022.16	2.707	6.982	0.322	0.113	90.361	None	None ?	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt 0.0757 per cent. Beer has a sour taste.
455 Porter ..	1019.91	4.152	6.769	0.321	0.080	89.079	None	None ?	Ash white, no excess of carbonates, sulphates heavy, chlorine calculated as salt, 0.0469 per cent.

* India pale.

BEER ANALYSIS — Continued.

Number of sample.	Specific gravity.	Percentage of alcohol by weight.	Percentage of extractive matter.	Percentage of ash.	Percentage of phosphoric acid.	Percentage of water.	Substitutes for hops.	Substitutes for malt.	Remarks.
456 Lager ..	1015.78	2.971	5.452	0.240	0.0875	91.577	None	None	Ash white, no excess of carbonates, strong traces of sulphates, chlorine calculated as salt, 0.0069 per cent.
457 Lager ..	1020.38	3.575	6.875	0.1805	0.0597	89.550	None	None	Ash white, no excess of carbonates, sulphates in traces. A very fine sample of beer.
458 Weiss..	1005.46	0.755	1.725	0.222	0.0315	97.520	None	Yes apparently	Ash white, no excess of carbonates, sulphates present, chlorine calculated as salt, 0.0069 per cent.
459 Ale	1022.42	3.096	7.181	0.352	0.06082	89.723	None	Yes	The phosphoric acid much too low for ash. Ash white, no excess of carbonates, sulphates very heavy, chlorine calculated as salt, 0.0309.
460 Weiss...	1007.78	1.873	2.855	0.235	0.0396	95.272	None	Apparently	Ash white, no excess of carbonates, sulphates in traces, chlorine calculated as salt, 0.0522 per cent.
461 Weiss...	1007.09	0.8029	2.219	0.285	0.0287	96.978	None	None	Ash white, no excess of carbonates, sulphates in strong traces, chlorine calculated as salt, 0.211, very heavily salted, no beer in the proper sense of the word.
462 Weiss...	1004 39	1.975	2.010	0.1833	0.048	96.015	None	None	Ash white, no excess of carbonates, chlorine calculated as salt, 0.0793 per cent, sulphates in traces.
463 Lager*	1003.97	4.819	3.219	0.151	0.0508	91.962	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace.
464 Porter .	1015.34	5.083	6.294	0.325	0.09137	88.623	None	None	Ash white, no excess of carbonates, sulphates considerable, chlorine in traces. The beer had a very slight acid taste.
465 Ale†	100[illegible].18	5.878	5.011	0.295	0.0797	89.111	None	None	Ash white, no excess of carbonates, sulphates strong, chlorine calculated as salt, 0.0162 per cent.
466 Lager‡ .	1017.44	3.4501	6.056	0.230	0.0719	90.494	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine in traces. Taste rather sour.
467 Lager§ .	1017.72	4.505	6.606	0.293	0.0957	88.889	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine in traces. This beer had a rather sour taste.
468 Ale‖	1015.09	2.636	5.177	0.314	0.0774	92.187	None	None?	Ash white, no excess of carbonates, sulphates in heavy traces, chlorine calculated as salt, 0.0092 per cent. A fine hop-flavored sample of beer.
469 Ale	1010.00	4.304	4.569	0.234	0.0749	91.127	None	None	Ash white, no excess of carbonates, no sulphates present, chlorine calculated as salt, 0.057 per cent.
470 Lager ..	1013.28	4.302	5.414	0.226	0.0889	90.284	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace.
471 Lager ..	1018.58	4.110	6.659	0.236	0.1008	89.231	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace. A good sample of beer.
472 Lager...	1014.75	3.714	5.531	0.255	0.1059	90.752	None	None	Ash white, no excess of carbonates, sulphates absent, chlorine a trace.
473 Lager...	1012.82	4.035	5.061	0.2604	0.1204 !	92.904	None	None	Ash white, no excess of carbonates, sulphates none, chlorine in traces. A good sample of beer.
474 Lager...	1010.79	4.245	4.748	0.239	0.108	91.007	None	None	Ash white, no excess of carbonates, no sulphates, chlorine a trace.
475 Lager...	1020.05	3.720	6.870	0.292	0.0574	89,410	None	Questionable	Ash white, no excess of carbonates, sulphates present, the chlorine calculated as salt equal to 0.0367 per cent. Beer slightly sour.
476 Lager...	1015.31	3.858	5.764	0.295	0.1056	90.378	None	None	Ash white, no carbonates in excess, sulphates present in traces, chlorine calculated as salt, 0.023 per cent. Beer had a sour taste.

* Kaiser Lager. † India Pale Ale. ‡ German Lager. § Bavarian Lager. ‖ Bass' Ale.

:t will be seen that no substitute for hops nas oeen found, and that :egards substitutes for malt, the chemist speaks with great caution. suspects the addition of glucose in several instances, but cannot nounce on this point with any degree of certainty. No harmful redient has, however, been detected.

NORMAL BEER.

)o these analyses show a violation of the law in respect to con- ing ingredients that are "not normal or healthful to exist in such erages?" On an affirmative reply to this question will depend future action of the Board in the matter of prosecution. Mani- ly before an answer can be given it will be necessary to have a clear erstanding of what is a normal beer. Unfortunately, however, :e exists no statutory definition, nor, in fact, any agreement among se supposed to be authorities.

TCHERLY, in reference to what ought to be the composition of beer, :

Beer is the fermented infusion of malted barley flavored with s which, by law (English), are the only substances permitted to be l in its manufacture. How far this law is carried out is a matter ch only analysis can determine."

ASSALL says: "Malt beverages should consist solely *of the product nalt and hops*, the former of which has been subjected to fermen- n, and all varieties of these beverages should be due to these and e alone, the color should be due solely to the degree of heat to ch the malt has been subjected in the kiln and to the ripeness and r of the hops employed;" and adulteration is defined as follows: y other substances than the constituents of malt and their deriva- s, hops and water in such proportion as in the case of stout, strong pale ale, to reduce the absolute alcohol to less than 4.5 per cent, in porter and beer to under 3.5 per cent. Although the law allows addition of both sugar and salt we regard these additions as lteration."

n the other hand malt may be derived from other grains than ey and in fact is. Webster defines malt as "barley or *other grain* ped in water till it germinates, and then dried in a kiln thus evolv- the saccharine principle." While a gentleman who evidently takes omewhat liberal view, defines normal lager to be "a fermented erage, not less than six months old, made from any starchy grain, rendered bitter to suit the consumers' palate."

'here seems to be, therefore, an agreement in defining malt beverages eing composed solely of malt and hops; but a difference in regard he kind of grain from which malt is to be derived, some claiming

that it should be confined to barley alone and others taking a wider latitude. It is evident that until a normal standard of beer is determined upon the present law will have little effect.

By way of ascertaining the views taken on this subject by the leading brewers of the country, correspondence was instituted with the Brewers' Association, and the following letter from the secretary will be read with interest.

ALFRED LUDLOW CARROLL, M. D., *Secretary:*

DEAR SIR — Availing myself of your kind permission I take the liberty to inform you that, at a meeting of the Advisory Committee of the United States Brewers' Association, Dr. Schwarz and I submitted your timely suggestion in reference to normal beer, recommending that the matter be referred to the Board of Trustees of the Association at its annual convention in May next. The committee, at once, passed a resolution to that effect and instructed me to transmit to you a copy of the same, and to assure you that the brewing trade is under many obligations to you for the interest you have manifested in our efforts to offer to the public a pure article.

Personally, I may be permitted to add, that you can do immense good by clearly stating in your official report what brewers should be allowed to use in the manufacture of beer and what not. So many prejudices are at present being aroused by biased persons against beer, and the ignorance of a great mass of the people on scientific subjects is so frequently appealed to in an insidious way that an official utterance from a competent authority as to what constitutes adulterations would greatly aid the honest brewers. At the same time you cannot, I think, serve the public better than by condemning, as severely as possible, the use of deleterious stuffs, and by recommending practicable laws of the utmost stringency for the punishment of adulterators."

G. THOMANN.

The following is the resolution referred to:

"*Resolved*, That this Committee submit to the United States Brewers' Association, at its next convention, the proposition of establishing a normal standard for the character of malt beverages so far as ingredients and age are concerned."

MODERN BREWING.

There are various contrivances resorted to by which time and labor may be saved, but whether in doing so the quality of the brew is improved may well be questioned. Of course all brewers had to learn their first lesson in malting the grain and converting its starch into sugar from nature, for this is really what nature does to provide the sweet fluid for the sustenance of her young.* Starch and gluten constitute the chief components of all grains, and they are designed to form the first nutriment

* Chemistry of Common Life.— JOHNSTON.

›r the tender plant; but being in their natural state insoluble in water, ıey cannot pass from the body of the seed to sustain the growing ərm. As the sprouting, however, proceeds, chemical changes take ace at the base of the germ, the gluten being changed into a white ·luble substance called *diastase*, which acting on the starch converts into grape sugar, which is soluble in water, and can thus in a liquid rm be utilized for purposes of nutrition.

The brewers at first caused the grain to sprout, thus producing iastase from the gluten, and thereby converting the starch into ıgar, reduced to liquid form by the addition of water. The addi-on of yeast to this wort would split it up into alcohol and car-onic acid in the process of fermentation, and being flavored with ops would in due time form a pure and wholesome beverage. In the ıarch of progress, however, man seeks to improve upon nature and cience is called to his aid to enable him to do it. It was soon ascer-ained that a certain characteristic of the diastase pointed out the way :or abbreviating the labor of brewing. Good malt was found to con-:ain one pound of diastase to every hundred pounds of starch contained in the grain, and that this pound of diastase was capable of changing into grape sugar, not only one hundred pounds of starch, but ten times that amount; hence the brewer found that the diastase of a certain portion of malt was sufficient to change not only all the starch it contained into sugar, but the starch in many times that amount, and that raw grain could be added, thus avoiding the expense and time of malting the latter. This was the first departure from nature's slow and certain method; whether an improvement or not is open to question.

Another property of the diastase was discovered to be that heating the solution containing it to the boiling point, destroyed its power of changing starch into sugar. This determined the time when the wort might be safely boiled, and the hops introduced, which of course ought not to be until the starch had all been changed.

While some brewers have malting departments connected with their breweries, others, adopting perhaps the principle of division of labor, purchase their malt already prepared, and thus the malt business separate from the brewing, has grown to considerable dimensions in this State.

The brewer then commences where the maltster leaves off, and is saved the work of steeping, germinating and roasting the grain. While some brewers profess to use only malted grain in the manufacture of their beers, others frankly admit the mixing with it of glucose. Before,

however, discussing the effect of this practice, it may not be devoid of interest to note the difference in the processes of brewing lager beer, as distinguished from ale and porter, the consumption of lager so greatly preponderated in this State.

* It has been ascertained that the temperature at which the fermentation of the beer has taken place exerts a great effect on its keeping properties, and on its liability to become sour from the formation of acetic acid. When the wort is at a high temperature the action of the yeast is very brisk and the large bubbles of carbonic acid formed carry the yeast globules to the surface of the liquid where it forms a thick scum. The fermentation is called top fermentation. The scum prevents the access of the oxygen of the air to the fermenting fluid, and the yeast takes, therefore, the oxygen necessary for its formation from the sugar contained in the liquid. The sugar is thus destroyed before the whole of the nitrogenous matter held in solution has been used up by the yeast. The beer after it has been drawn off contains, therefore, in the case of top fermentation, nitrogenous matter, which acting as a ferment induces the oxidation of the alcohol and the formation of acetic acid. When, on the other hand, the wort is fermented at a low temperature, as is the case in the preparation of Bavarian beer, carbonic acid escapes from the liquid in minute bubbles, and the yeast is not carried to the top but remains at the bottom. Hence this mode of fermentation is called bottom fermentation. The oxygen of the air has free access to the liquid and consequently the yeast takes the necessary oxygen from the air instead of the sugar, as in the previous case and the nitrogenous matter is wholly converted into yeast before all the sugar is decomposed. The beer thus prepared contains, therefore, but little nitrogenous matter which might act as a ferment, and it keeps consequently much better than beer prepared by top fermentation. In the latter case the yeast consists of gluten oxidized in a state of putrefaction and the bottom yeast is the gluten oxidized by slow combustion.

THE GLUCOSE QUESTION.

A good deal has been written about the deleterious nature of glucose and the evils resulting from its use in the brewing of beer, which examination shows to be much exaggerated. The brewer, it is claimed, requires malt, whether obtained from barley or other grains, mainly for the sugar or glucose it contains. The starch of the grain is converted into sugar, and the sugar in the process of fermentation into alcohol. Manifestly whether the brewer goes through the long process of malting the grain, in order to obtain therefrom the glucose, or utilizes glucose already prepared, the result is the same.

Still, however, we may dissent from the unreasonable position taken by many in regard to glucose and its properties, it will not be safe to

* Hassall: Food and its adulterations. London, 1886.

lispose of this question in a summary way, for, as Hassall very properly remarks:

"The extract of malt contains a variety of other substances, organic and mineral, beside sugar, so that the beverage produced from brewing malt extracts and the mixture of this with sugar and various other substances is very different in its actual composition and in its dietetic properties and effects."

The Massachusetts Board of Health, as quoted from the New York American Analyst, February 15, 1886, has some very sensible comments on this glucose question, calculated to dispose of popular fallacies regarding its supposed dangerous qualities. When properly and carefully manufactured, it regards it as a wholesome food, deficient however in sweetening power; but a dangerous article to be taken into the system when carelessly prepared. The question then turns upon its mode of preparation, Glucose is usually made from the starch of corn by boiling it with dilute sulphuric acid, a process first discovered by Professor Kircoff, a Russian chemist in 1811,* and largely practiced in Austria and Germany since that time; but only within a comparatively recent period introduced into this country. The process is thus described by the Massachusetts Board of Health:

"The starch is first obtained in a pure condition from the corn, then mixed with water, and the mixture is heated to boiling. Sulphuric acid is added to the extent of about two per cent, and it is then boiled about three hours. The starch is by this time converted to sugar and dextrine, both of which are in solution. The free acid is then got rid of by the addition of chalk or marble dust, which with the acid forms calcic sulphate, which settles to the bottom and leaves a clear supernatant fluid, which yields glucose and dextrine. Should all of the acid not be removed, or should the calcic sulphate be in any amount retained, it is evident that the product would not be entirely harmless, since disturbances of the digestion might follow its use. Moreover, the contaminations which are ordinarily present in commercial sulphuric acid will of course be present with the acid," and JOHNSTON claims that "such beer is deficient in the aromatic principle found in the skin of the grain."

It is hardly within the province of this Board in the absence of any law on the subject, to dictate to the brewers what they shall use in the making of beer, or declare that malt shall be made from barley alone when it is not yet settled that malt from other grains will not answer as well. It is however the duty of the Board to insist that no harmful constituents shall be used, leaving it to the brewers themselves to make their own selections from the whole range of wholesome substances.

It will be safe then for the State Board to recommend that the laws

* See Second Rep. State Board of Health of New York, page 596.

should state specifically that malt beverages should contain no other ingredients than the constituents of malt and with their derivatives well as hops and pure water.

EXCESS OF BICARBONATE OF SODA.

The practice of charging the beer kegs with bicarbonate of soda, is one resorted to only when needless haste is made in turning out upon the market beer before the process of fermentation has been completed, and fermentable matter remains which is likely to sour. The bicarbonate of soda counteracts this tendency to acetification and gives the beer a good head; but beer that has lain from four to six months has in itself sufficient carbonic acid without resorting to this artificial charging, and the process of fermentation is so complete that there is left in it nothing likely to acetify. The practice, therefore, is simply an accusation of the beer to which it is added.

Dr. Bartley, of Brooklyn, speaks of the custom of brewers sending out to the market beers only fourteen days old, containing more or less yeast, and clarified by artificial means instead of in the natural way. He further shows that while bicarbonate of soda taken into the stomach in small quantities is quite harmless; yet in the frequent potations of habitual beer drinkers, who imbibe say thirty glasses per diem, an amount ranging from 180 to 200 grains of bicarbonate of soda, may be introduced into the system, with necessarily deleterious effect.

Another danger to be guarded against is at the retailers where it is alleged adulteration is carried on, either with the object of increasing the quantity, its intoxicating power, its pungency or to revive old beer and give it an artificial color, resulting, of course, in a deteriorated article. No matter how good the beer may be when brewed it is always liable to harmful manipulation in the hands of a conscienceless retailer. Water is added to increase the quantity with the result of lowering the proportion of its constituents and lessening its flavor. Tobacco or the seeds of cocculus indicus are added for intoxicating effect; color and flavor are given by means of burnt sugar, liquorice, treacle, quassia, coriander and carraway seeds. To increase the thirst of the consumer salt and cayenne pepper are put in, and various mixtures are concocted to get rid of stale ale. For these the brewers are certainly not responsible.

To maintain a proper surveillance over all the saloons of the State would be a work of great magnitude, and could only be effected by pressing into service the local boards of health of every town, village and city.

IMPORTANCE OF PURE WATER.

The sanitary surroundings of breweries, and the purity of the water employed, are all of vital importance to the quality of the beer. In regard to the latter, it has been remarked that

"It is well known that the quality of the water used has a great effect on beer, on the extraction of the soluble constituents of the malt, and on the subsequent clarification of the fermented beverage.

For the first purpose a soft or even an alkaline water would appear to be the most suitable; but, for the second, there is no doubt that waters containing much lime are the best. The lime combines with the phosphoric acid of the malt and forms an insoluble salt, which assists in carrying down any suspended matter.

In the course of boiling, the excess of carbonic acid in the water, by which the carbonates of lime and magnesia are dissolved, is expelled, and these salts are precipitated; again, the alkaline phosphates present in malt have the power of decomposing and precipitating sulphate of lime, phosphate of lime and a soluble alkaline sulphate being formed, but part of the phosphate of lime so formed is re-dissolved in the acid generated during fermentation. The water from being at first hard, thus becomes comparatively soft, and in this state is well suited for the extraction of the active properties of the malt and hops."

In regard to the water used by the breweries of our own State, of course, that depends upon the local supply for potable purposes. The subject of the purity of potable water-supplies has become of so much interest to the citizens and has led to such earnest efforts to secure this end, that the quality of the beer may be expected to partake of the improvements made in this direction.

SANITARY CONDITION OF BREWERIES.

A few selections from the notes of our inspector in regard to the sanitary condition of the breweries visited may serve as an example of their general condition.

One brewery in was an old place in bad repair, and so foul and unclean that it would seem as though any thing manufactured in such a place must be unfit for drink.

Brewery in was small, dirty and loosely conducted.

At is a medium sized ill-kept place, and, from various signs, should judge the beer to be bad. Owner's reputation is bad and retailers refuse to handle his beer quite frequently.

At , medium sized brewery, not very clean. The cellars were quite sour.

Another at was of medium size and clean up stairs, but the cellars were foul, dirty and utterly unfit for use.

Another at same place was only fairly kept and their beer was ap rently very bad.

At was a small dirty brewery, the kettle for boiling the b and a stable full of foul smells occupying a cellar together.

At was a fairly clean, medium sized brewery. The cell were particularly sweet for an ale brewery.

Another at was old and undergoing repairs and consequen dirty, but I judged, that at best, it is slovenly kept.

Another place was middle sized, carelessly run and not over clean

At is a very large establishment consisting of two brewer divided by a canal. They are connected by a passageway built in arch of the creek which runs under the canal and into which most the sewage of....runs. The odors from this creek permeate cellars adjacent to the passageway. The rest of the breweries are v well kept, sweet and clean. A malt-house is connected with the br eries in which all the barley used is malted. Well-water is used making the beer.

Another brewery at was a good sized place and well kept, cept that the cellars were very wet, the result of an overflow, the dr having been stopped up during the heavy storm of Saturday morni

Another brewery out of the city of , uses water from a la spring. The buildings are all new, and, as at another brewery, an machine is used which is much cleaner than ice.

Another brewery in was a little, dilapidated, dirty place.

Outside of is a brewery which is an old place and dirty.

In was a small place, clean and very dry.

A brewery at was small, old and dirty. A new part is nea finished and will soon be occupied, when the old place will be t down. Its cellars are blasted out of solid rock which comes to witl two feet of the surface.

Another brewery, at same place, is a large concern, well manag and fairly clean. Their cellars are in the rock and go down forty-f feet and are well drained, all the dripping of water and beer runni into two tubs sunk below the lowest cellar floor, from whence it pumped up and allowed to run into the sewer. A like system is need in all the breweries having rock cellars, but this is the only one which I have found it.

Next brewery visited was medium sized and not very clean. M of their cellars are in the rock.

Another was a very small place, rather dirty, with poor cellars.

At the largest brewery in , the buildings, machinery, etc.,

new and very fine, well-kept and clean. The cellars are in the rock, and are carefully washed and drained.

A brewery was found to be fairly clean up stairs but the cellars were foul and dirty.

Another well-kept brewery has its cellars in the rock and they are well-washed and drained.

The next was of medium size, dirty, with sour smelling cellars.

At , is a brewery, fairly well kept, although the lower parts are very wet.

At , is a medium-sized place, not clean, not well-managed and part in poor repair.

At , a medium-sized place, using water pumped directly from river. It was clean and fairly kept.

At , is a large, very well-kept brewery. It is very clean and and carefully drained.

At , a medium-sized brewery, fairly clean, with well-drained cellars. Spring water is used in the beer.

Another brewer, at same place, secures the water for his beer from a well and a spring.

At , was a very small, dirty place at which water from a well is used in the beer.

At , visited an old established place where spring water, brought from out of town, is used. They claim to make their beer just as good as when the brewery first started, that is from malt and hops alone. They complained bitterly of the ruinous competition of brewers who use cheap articles.

A number of other breweries visited were described as having foul, wet and filthy cellars, while those connected with other breweries were sweet and clean.

RECOMMENDATIONS.

First. The law should be amended so as to define the normal constituents of malt beers or malt beverages.

Second. That a malt beverage should, as its name indicates, contain only malt and hops, with their constituents, and water.

Third. That Congress should pass a law making it obligatory upon the Internal Revenue Department, at all times, to permit publicity to be given to the ingredients reported to it by the brewers and distillers as having been purchased from which to brew or distil.

Fourth. That the local boards of health, throughout the State, should have a special surveillance over the sanitary condition of the

breweries within their jurisdiction, and should, through their hea officers, make periodical visits and report upon the condition of the establishments.

Fifth. That no other than pure water should be used in the brewir of beer.

Sixth. That the local boards of health, throughout the State, shoul have a special surveillance over the saloons located in their jurisdiction and should, from time to time, have samples purchased of the beverages sold and forward them to an analyst for examination; and that some arrangement should be made whereby the expense of these analyses be defrayed by the board of excise.

Seventh. That no condition of secrecy should be imposed in the law relating to beers, spirituous or malt liquors, but that it should be admissible on the finding of any adulterants or harmful ingredients in any sample examined, to have the fact made public as the best means of correcting the pernicious practice.

FREDERICK CARMAN,
Assistant Secretary.

At a meeting of the State Board of Health, at New York, on the 3d of March, 1886, the Chairman of the Executive Committee presented with his approval the above report, and, on motion, its recommendations were adopted, the report ordered printed and laid before the Legislature.

FREDERICK C. CURTIS, M. D.,
Acting Secretary.

SYRACUSE, *February* 26, 1886.

To the State Board of Health of the State of New York:

GENTLEMEN — I have the honor to submit, herewith, the following report of my examination of the samples of beer sent to me per express, by your Secretary.

Most respectfully,

FRANCIS E. ENGELHARDT, PH. D.,
Analyst.

Having in a previous report to your honorable Board (contained in the second annual report of the State Board of Health, Albany, 1882, on page 667 to page 687) given the definition, constituents, methods of brewing and analysis of beers, together with some remarks on adulterations and an exhaustive report on the literature of malt liquors, I shall confine myself to-day to the results found in my late investigation of the beers manufactured in the State of New York, adding such recommendations and remarks as I deem most proper to the subject under consideration.

The number of samples of beer examined up to date are 476. Among them were samples of porter, ale, lager beer, present use beer and weiss beer.

The results of the analyses of these samples of beer, which I forwarded from time to time to the Secretary's office in Albany, and which have been very kindly tabulated by the Assistant Secretary of your honorable Board, show by comparison remarkable differences both in composition and physical characters.

Thus, the specific gravities of the various samples of beer vary from 999.44, found in sample 248, to 1037.00 of sample 289.

The specific gravities of the samples of beer after removal of alcohol (by evaporating 100 cubic centimeters or grammes of beer, to about one-third, and then replacing the loss thus sustained exactly by distilled water, to 100 cubic centimeters or grammes), varied from 1001.83, found in number 426, to 1033.63, in number 207.

The variations in alcoholic strength are not less remarkable. The lowest amount of alcohol was contained in sample 132, namely, 0.677 per cent by weight, and the highest in sample 32, namely, 8.994 per cent by weight.

The quantity of extract varied from 1.277 per cent, in sample 426, to 10.058 per cent, in sample 207.

The ash of the beers was lowest in sample 155, namely, 0.069 per cent, and highest in sample 403, namely, 0.4676 per cent. Apparently, number 191 has the most ash, namely, 0.557 per cent, which includes 0.0992 per cent of salt; if we deduct the latter from 0.557 per cent, only 0.4578 of pure ash remain.

The addition of salt to beer is unquestionably practiced in this State to a great extent by porter, ale and weiss beer brewers, but much less by lager beer brewers. It is added by some to give taste

to the beer, as they express it; by others to clarify the beer, since b the addition of salt to beer, rich in carbonic acid-gas, the latter partly liberated, and while ascending in the beer, carries along t the surface the mechanically suspended matter in the beer, an which then may be removed by skimming. If I am properly in formed, the English law allows the addition of fifty grains of sal per gallon of beer, or about 0.086 per cent. Of the samples exam ined for salt 23 contained over 0.10 per cent; and in sample 7 no less than 0.338 per cent were found.

That salt creates thirst is well known, and hence we may conclud that it is often added for this purpose. (Some samples of beer wer found entirely free of salt — respective chlorine.)

A sample of beer, when having not received an addition of sal by the brewer, should contain no more than ten grains per gallo and which may be due to the water employed, since only very rarel waters are entirely free of chlorine respective salt. If a water use for malting, brewing, etc., contains more chlorine than the equiv lent of ten grains of salt, it is in my opinion unfit for these pu poses (except waters in salt regions, etc.) since the excess above te grains per gallon is almost in every case due to drainage from neighboring privy, cess-pool, broken sewer, etc., into this wate In the first samples of beer analyzed, the salt (chlorine) was n determined; first when the ash in many samples found was muc larger than could be expected by a comparison with the other in gredients of the beer. I determined the chlorine and calculate from the results of the former the corresponding amount of th latter. I found, moreover, that when deducting the salt from th total ash, the latter was in many cases about three times greater tha the phosphoric acid found.

Although salt is not injurious in the quantities usually added t beer (0.10 per cent salt equal to about fifty-eight grains per gallon o beer) there should be a proper limit, if the addition of salt is allowe

The phosphoric acid is a very important ingredient in good bee It should amount to about one-third of the pure ash of the bee In my examination I found it lowest in sample 442 (a "wei beer") namely, 0.0264 per cent, and highest in number 403, namel 0.1661 per cent.

Beers with a high percentage of alcohol and extract and a lo percentage of phosphoric acid may be considered, as beers mad with substitute for malt, especially glucose and grape sugar. Th addition of the latter two to beer wort (taking the place of a cer tain amount of barley malt in the manufacture of beer) are n objectionable if properly prepared on the ground of being injurio to health, but on the ground that by substituting them for mal the normal constituents of a good malt beer are changed to th *detriment* of the consumer, since they neither contain albuminoid nor phosphates, both of which must be considered very importa foods in the beer.

In my former report, on page 678, I said:

"To give to beers, especially those that have been made by *substituting* a portion of barley malt by grape sugar, glucose, starch, potatoes at the reqnired viscosity (vollmündig keit) and the *ash constituents* (albuminoids and phosphates) wheat bran and phosphates of the alkaloid are recommended." Some of the samples of beer submitted to examination seem to have received some of the latter treatment.

The employment of corn, rice, wheat and oats as substitutes of barley malt do not deprive the resultant beer of phosphoric acid and albuminoids in the proportion that grape sugar and glucose do, but nevertheless they are an imposition on the beer-drinking public and should not be allowed.

On page 667 of my report of malt liquors of 1882, I said:

"Under the name 'beers' in the widest acceptation of the word, are included beverages which are produced by vinous fermentation and which usually are still in a state of slow after-fermentation. They differ from distilled liquors, especially in their larger amount of solid matter remaining after the removal of water and alcohol (volatile acids). This residue consists of sugar, dextrine, albuminoids, phosphoric acid, potash," etc.

"If we accept this definition of 'beers' it follows that they may be made from any saccharine or starch-containing material; thus opening the door for the unscrupulous manufacturer to use all kinds of adulterations, substitutes, etc. Hence it is *absolutely* necessary to define 'beers' as the Bavarian government has done, namely, as wine-like liquids, yet in a state of after-fermentation prepared *only of barley, malt, hops, yeast and water*. To this might be added the lowest amount of malt and hops to be employed by the brewers in the manufacture of one barrel of beer of thirty-two gallons, and also the age the beer should have attained before it reaches the consumer."

"All similar beverages produced by the use or substitution of various materials for malt and hops must be sold under the name indicating the substitutes employed, as 'rice beer,' 'wheat beer,' 'corn beer,' 'grape sugar beer,' 'glucose beer,' etc. Thus all fraud would be prevented, a more uniform product obtained and a wholesome beverage insured."

The number of beers free of sulphates were 64, or about 13.5 per cent of the samples examined. Since many beers are brewed with water containing sulphates (especially sulphate of lime) their presence is but natural; an excess in many cases may be due to the addition of gypsum, but also, to some extent, to the use of grape sugar and glucose, since both of them often contain some sulphate of lime or gypsum. (My investigation of a number of glucose and grape sugar samples in this direction has not been far enough advanced to give proper figures now.) The use of bisulphite of lime as a preservative added to beer may also increase the sulphates.

To find the strength or percentage of saccharine matter in the

beers (before it is submitted to fermentation) called "wort" we multiply the alcohol found in the beer by two (sufficiently accurate for all practical purposes), and add to the resultant product the amount of extract found in the same beer.

Beers with a saccharometer strength of the wort above 20 per cent were nine in number, namely:

Number.	Alcohol.	Extract.	Wort.
403	6.756	8.651	22.363
416	7.061	6.091	20.213
425	7.304	8.527	23.135
32	8.994	7.929	25.917
35	7.444	6.929	21.817
370	7.679	5.829	21.187
389	8.193	5.894	22.280
160	8.333	6.738	23.404
61	7.537	5.699	20.773

The lowest in saccharometer percentage was sample 31, namely, 3.235 (a kind of weiss beer). Beers like the above are usually made for export trade.

Of beers lighter in alcohol and heaviest in extract there are also several samples; No. 289 has of alcohol .9625 per cent by weight and 9.547 of extract; original wort, 11.472 per cent. Sample 132 contained .677 of alcohol in per cent by weight and 4.152 of extract, original wort, 5.422. (Liquids of this kind — I mean the latter one — should not be classified under the beers.)

Unfit to be drank either of being too sour, having a musty taste, or being too roily, ten numbers have to be recorded. A number of samples of beer (so called) sent to me for examination contained less than 6 per cent of saccharometer in their wort. Their number was 18; while 17 samples contained between 6 and 10 per cent.

A good beer, in my opinion, should be made of a wort of at least 11 to 12 per cent of saccharometer.

In regard to the physical characters of the beers under consideration, I found that 113 samples, or 23.79 per cent, could be considered perfect, 127 samples, or 26.50 per cent, almost perfect, and 219 samples had to be considered inferior, or about 46 per cent of the entire number examined. Slightly sour I found 81 samples; decidedly sour 58 samples.

Since a considerable number of the beer samples were collected during the warm weather, hence were exposed to its influence, some allowance should be made in considering the above results.

A considerable number of beer samples were young beers — perhaps, in most instances, not over fourteen days old. At the bottom of these samples (contained in champagne bottles) were heavy sediments of yeast. The brewer, when the first fermentation (the main one) is finished in the fermenting tubs, clarifies, though often in an insufficient manner, the beer by artificial means, and fills it in the

casks intended for the retail trade. To give to the beer a certain amount of carbonic acid, above that which is remaining naturally in the beer, he adds a piece of compressed bicarbonate of soda (from one to two ounces, or more, according to the capacity of the cask); and if the beer contains an insufficient amount of lactic acid, etc., some tartaric acid, cream tartar, etc., is added. Thus this brewer is enabled to turn his capital over at least twelve times a year, while the honest brewer, who allows his beer to attain an age of from eight to twelve weeks, can do it only four times, or five times. But, apart from the money consideration, beer made in the manner just described, and sent to the consumer when only two weeks old, injures the latter's constitution, not only by the presence of soda in the beer, but also by the presence of the yeast, since, according to investigations made under the supervision of Professor Von Pettenkofer, beer roily from yeast cells, though respective small quantities of such beer are taken, it acts on the digestive organs in such a manner as to produce catarrh of the stomach and intestines; hence the city ordinances of many Bavarian cities contain laws prohibiting the sale of beer roily from yeast cells, or decidedly sour, under heavy penalties. ("Repertorium der Analytischen Chemie," No. 21, November, 1885.)

In none of the 477 samples of beer submitted to me by a careful investigation for hop substitutes, any of the latter could be proved to be present with certainty.

In regard to substitutes for malt, I have marked each sample in regard to the results found.

In conclusion I would recommend: First — to define beer (*to be made of barley, malt, hops, yeast and water only*) — that beer, made by substituting wheat, corn, rice, grape sugar, etc., for a portion of barley malt, must be called according to the substitutes, rice beer, wheat beer, etc.

Secondly — No lager beer to be sent in the market, that shows on examination to have been made from a wort of less than 11 to 12 per cent saccharometer.

Thirdly — That no lager beer be sent to the consumer less than eight to twelve weeks old, and properly clarified, before sending, so that it be free of yeast cells, as far as this can be accomplished.

Fourthly — That no bicarbonate of soda be added to the beer sent to consumers to give it the artifical carbonic acid gas, nor glycerine to increase its viscosity.

Fifthly — That no substitutes for hops are permitted, though they be harmless.

REPORT

OF THE STANDING COMMITTEE ON REGISTRATION AND VITAL STATISTICS.

With the exception of the cities of New York, Brooklyn, Yonkers, Buffalo and Albany, all local health organizations throughout the State are required to send the records of births, deaths and marriages to the central office of the State Board of Health for registration. The Board is, therefore, relieved of the sanitary oversight, and the registration of the vital statistics records of 2,381,000 of the population of the State gathered in these large centers, and has charge of this work for the remaining 3,000,000 inhabitants scattered over its extensive area. The work of the Board, so far as its committee on registration and vital statistics is concerned, is to direct and secure the collection and registration of certificates, properly filled out, of all births, deaths and marriages, and, as essential to this, the organization of local boards of health in the towns, villages and cities in whose respective precincts they occur. After registry in the local office they are all registered together in the central office of the State Board.

Changes in the laws.— Difficulty has always been met with in enforcing the statutory requirements upon some individuals in the community to make these returns. Prior to the act passed by the last Legislature [an act for the preservation of the public health and the registration of vital statistics, chapter 270; passed May 12, 1885] physicians and midwives were required to make returns of births of which they had charge, and the returns of marriages were required of the officiating clergymen or magistrates. The lack of adequate authority and suitable methods has been felt. It is now made the duty of the parents or custodians of every child, within a specified time after its birth, to return the record of the same, duly attested by the physician or midwife, if any, in attendance; and every marriage is to be reported by the groom, with the attestation of the clergyman or magistrate performing the ceremony, or directly by the clergyman or magistrate. Many of these returns are still made, from long-continued habit, by the physicians and clergymen, and it is to be hoped that this will continue, thus materially facilitating the completeness of these returns. But the question can no longer arise as to the constitutionality of the obligation resting where it now does, and the enforcement of the law is entirely feasible, although time will be required to educate the people and the local boards of health to its complete observance. The returns of deaths, the obligation of which rests upon the undertakers or persons having charge of the dead, is likewise feasible of enforce

ment. While it has been the experience everywhere, even in the older countries where the work of registration of vital statistics has been for a long time carried on, that it is very difficult to secure absolutely complete returns, still constant effort effects more and more perfection, and the beneficial influence upon it of the law of 1885, especially in the returns of marriages, has been felt during the year in the greater completeness of these returns.

The policy of the system of health organizations has been, since the State Board of Health was organized, to make the registration complete through the agency of the local boards of health exclusively. Although a copy of the law has been sent to every local board, still considerable correspondence has been required to explain that no dependence remains upon the means which county boards of supervisors had been empowered to use, under the Laws of 1847 and 1880 (chapter 154 of 1847, and 512 of 1880). These laws are all repealed by that of 1885 (chapter 270), and the system of registry, sanitary work and all the machinery of health organization is limited entirely to the State Board and the local boards of towns, villages and cities. The text of this law is appended to this report.

A set of model sanitary ordinances, based upon this law, has been prepared by the late secretary and offered to local boards for their guidance in preparing their local ordinances. The legality of their requirements is established, as they have been approved by the Attorney-General. It is No. 53 of this Board, and a copy may be found after the law as part of this report.

The work of registration has been placed in a satisfactory shape during the year. The early years of the Board were devoted to the primary work of organization, almost to the exclusion of this duty. There in consequence accumulated many thousands of certificates, far beyond the capacity of the regular clerical force in the office to register. In May, 1884, the registration was nearly two years in arrears, less than 50,000 certificates having been put into the books. By resolution of the Board additional clerks were employed, to whom this back work was committed, the regular clerks being put forward to the current registry. During the year this work has been completed, and, besides, index volumes nearly to the present time have been prepared. About 225,000 certificates are on the registers in the office, and the work is now kept within a few months of the current date. By means of the indexes and the chronological system of registration these entries of certificates are readily accessible, and not infrequent requests come to the office from all parts of the country and abroad for certified copies of the records. The registration is now being kept up by the regular clerks in the office.

Estimating the receipts of certificates of births, deaths and marriages at this office by the number received in four recent months, in which 30,569 were received, there will come to the office during the course of the year not far from 100,000 certificates. Some of these, however, are delayed returns.

A slight change has been made in the form of the blank certificates.

[Her]etofore the name of the county and of the town has been printed [u]pon the form; this has involved delay in filling orders, was the [c]ause of additional expense to the local boards, and was considered [u]nnecessary, at least for the smaller towns.

The Board has adopted a form for recording still-births, prepared by the late secretary, Dr. Alfred L. Carroll. Heretofore there was no provision for the registry of these, and the blank forms upon which they were written were merely preserved without being recorded. A sheet has been sent to each registering officer upon which to enter these, preserving this register in his office, and he is directed, in sending his monthly returns here, to note the number of them, the certificates being retained in his office. As to the certificate of a still-birth, it should be considered as itself a certificate of death, calling for the issue of a burial permit.

To facilitate the work of the office, as well as to give regularity to that of the local boards, a circular has been issued directing local registering officers to send, at one time, by the 15th of every month, all the returns of births, marriages and deaths for the calendar month preceding.

Legibility is an important element of a certificate, and the lack of it in certificates which have passed the supervision of local health boards and reached this office is not infrequently encountered. It is particularly important on death returns, where the scrutiny which the law requires of the health officer over these certificates cannot be too thorough. Exactness in filling out answers to all questions on the blanks, and plain writing of the signatures should be required. The necessity of it is frequently found in the requests for transcripts of the records in this office. An urgent request for information as to the time of death of an individual has recently been received where it is difficult to determine whether it was "A." M. or "P." M.

The decision that local health officers are State officers and, therefore, necessarily coming under the requirements of the civil service examination whenever newly appointed, will effect two desirable improvements, a higher degree of competence and a greater stability in service. The latter point will operate to secure improvement in the supervision of the death certificates. At the request of the Civil Service Commission a circular has been sent to all local boards calling their attention to the requirements, without which appointments of health officers will not be valid; the board can either name one physician for a non-competitive examination or two or more for competitive examination. Three grades of questions, for towns, villages and cities, respectively, have been prepared by the board of examiners, and a written examination upon them is held by the county judges of the respective counties.

How far the local registry of large public institutions should be carried, swelling the mortality record of the locality beyond a legitimate degree, is an unsettled question. In large cities this is partly compensated for by the constant influx of young healthy adults from

the country. But in small rural villages the mortality rate of large infant and insane asylums, prisons and alms-houses materially affects the death rate as compared with the accredited population. In these latter it would appear equitable that in all printed reports of mortality, presenting the comparative healthfulness of localities, the deaths of public institutions should be separated from those of the population of the place. For large cities, although this may be a question, it would seem that they might with propriety be accredited to the locality for the reason given. In all cases it would be best that the returns should come through the local board, at whose office they should first be registered to effect a uniform observance of the law. In regard to unknown dead, brought by accident, as by the tides or river currents, to a locality, the few that cannot be traced as they should be to their legitimate place will not materially affect the local mortality rate. Some solution of this whole question of the proper accrediting of mortality, in so far as it affects a study of the movements of disease and vital statistics, awaits yet a satisfactory solution.

There are twenty cities required by law to make returns to the Bureau of Vital Statistics, 347 villages and 944 towns, making 1311 potential local boards of health. Of the cities, all have organized boards and make regular returns. About one-third of the 347 incorporated villages in the State have local health organizations; part of these make their returns through their town boards, however, being organized only for sanitary purposes. All incorporated villages are required to maintain health boards, unless the consent of the State Board is obtained to the contrary. Provision exists, as will be found at section 7 of the law of 1885, whereby combined sanitary and registration districts may be formed. Many of the villages have but a few hundred inhabitants and are so much a part of the town that a separate organization is not desirable. There are about seventy-five villages having a population of 3,000 and over, and it would in many ways simplify the work if these alone were required to comply with the law in regard to establishing boards of health, except in cases where other conditions than size made it advisable.

Of the towns, about 700 have organized boards of health, most of which make more or less regular returns of vital statistics. A considerable number of these have been organized within the year. The 250 yet unorganized town boards are for the most part in the more retired rural localities. Prior to 1880 no system of town health organizations was thought of, and this, together with the lack of a local exigency to stimulate the specified officials to activity, yet operates to delay what is desired in this direction. Efforts are being constantly made to secure the organization of all boards. There can be no question but that the principle upon which the health work of the State is based, of having the local work done by local authority, under the advice and assistance of a central board, which is especially desirable to them because of their frequent change in

personnel, and their to-be-anticipated inexpertness in sanitary affairs supplemented by the resources of the State Board is the best that can be devised and will be more and more productive, as it secures fuller operation, of the best results. By means of two sets of books kept in the office, record is kept of the local boards organized, together with their *personnel*, and also the regularity and number of their returns of vital statistics. A more perfect form for these books has been adopted during the year.

A *Monthly Bulletin of Mortality* was begun in April, 1884, and the issue of this has been continued through the year. This has proven of value in a two-fold way; regular information is obtained in its preparation of the activity of each reporting board and also a gauge of the healthfulness of all localities of the State, especially of the prevalence of preventable diseases, is secured. The publication distributes this information to the boards and to all interested, and contributes very much to keeping the people alert against all kinds of insanitary conditions that injuriously affect the public health. It has brought to light the laxity of collecting returns, and this has been rectified in several instances by this board, notably in the cases of Troy and Cohoes. Authority is given to this board to assume the registry of a locality if unsatisfactorily done by the local board. The committee on vital statistics are of the opinion that the good work of the board is very materially aided by the Monthly Bulletin.

In commencing the publication, the question as to how to represent all localities of the State, without specifying the mortality of every one of the reporting local boards in each issue, which was manifestly impossible even if desirable, was met by dividing the State into eight *sanitary districts*, which possessed some geographical and topographical individuality. This division had already been made for another purpose and with some amendment it was followed.

The Maritime district includes those counties bordering on tide-water, and the large commercial center of the State. It has a population, according to the census of 1880, of 2,098,580, the great proportion of which is urban. The *Hudson Valley district* includes the counties on either side of the river above Westchester, including Albany and Rensselaer; its population being 750,143, and in the seven cities in the district there being an estimated population of 247,000, or nearly one-third of the entire number. Topographically, it is uniformly hilly, and is generally well drained. The *Adirondack and Northern district* has a population of 330,434, and a very extensive area, including all the northern part of the State between the Vermont border, the St. Lawrence river and Lake Ontario. In it is the Adirondack region, justly famed as a health resort, and it also contains large regions of flat and often marshy territory, which is far from salubrious, containing a multitude of small lakes, rivulets and inlets from the large water bodies surrounding it. Much of it is but thinly settled, and there are but two cities in it, aggregating about 22,000 population. The

Mohawk Valley district lies along the course of the Mohawk rivei including Oneida county, and has a population of 280,809, of whicl 80,000 is in the four cities of Schenectady, Amsterdam, Utica an Rome, with a considerable number of large villages. It is less hill than the Hudson Valley district, and besides containing much o the most fertile land in the State has also a considerable manufactu ing population. The *Southern Tier district* takes in the counties seven in number, along our southern border. Its population i 365,746, and in its two cities of Binghamton and Elmira there ar 45,000 inhabitants; besides it has numerous large villages. It i largely upland country and well drained. The *East Central* an *West Central districts* together include the central counties of th State, the division being somewhat arbitrary. The region is chiefl agricultural and for the most part rolling and some of it hilly including, however, the territory of the small lakes, and some of it area being swampy and malarious. The population of the Eas Central district is 354,320, with the city of Syracuse of 65,000 in habitants; of the West Central, 321,247, with the city of Auburn o 26,000 inhabitants. The *Lake Ontario and Western district* ha a population of 578,505, and the four important cities of Buffalo Rochester, Lockport and Oswego with 340,000 inhabitants, takin in the counties along the southern coast of Lake Ontario, and als Erie county. While its population is so largely urban, this i lessened in its bearing, as Buffalo, with 200,000, is not reported i the Bulletin. Reports from all the other twenty-four cities of tl State are included.

In the Maritime district there are 47 towns, of which 9 have r organized boards of health.

In the Hudson Valley district there are 126 towns, of which have not organized boards of health.

In the Adirondack and Northern district there are 138 towns, which 45 have not organized boards of health.

In the Mohawk Valley district there are 136 towns, of which have not organized boards of health.

In the Southern Tier district there are 141 towns, of whic have not organized boards of health.

In the East Central district there are 128 towns, of which 31 not organized boards of health.

In the West Central district there are 122 towns, of whi have not organized boards of health.

In the Lake Ontario and Western district there are 105 of which 19 have not organized boards of health.

This summary gives some idea of the relative conditions o various divisions of the State and their relative degree of or tion. It will appear that in the Adirondack and Northern there are many towns unorganized, for the most part on acc the sparseness of their population and their remoteness from of travel, and that in the Southern Tier district the same half of the towns yet having no boards of health, part of t

the same reason. About half of the towns having no organized health boards lie in these two districts. These considerations are to be taken into account in studying the Bulletins for the months of the year, which with a summary of the year's mortality are appended to this report.

During the year there were reported in the bulletin of mortality 80,407 deaths. Besides, there were received about 3,000 reports of deaths too late to appear in the bulletin. The mortality of one of the largest cities in the State — Buffalo — has not been included, and estimating its annual mortality at 4,000, we have about 88,000 deaths accounted for. Estimating the present population of the State at 5,400,000, an annual death-rate of twenty per 1,000 would give a total mortality of 108,000, at which estimate the returns accounted for would fall short 20,000. Although the death-rate of the large cities materially exceeds twenty per 1,000 annually, it may be considered that for the entire population, both rural and urban, this is above the average. A death-rate of eighteen per 1,000 annually for the estimated population of 5,400,000 would give 97,200 deaths. It may perhaps be fairly said that the number of deaths occurring in the entire State is nearer this estimate, and is not above 100,000 annually, and doubtless ninety per cent of the actual mortality is secured. The actual death-rate cannot be given on account of the irregularity with which many of the smaller places have made their returns.

Although it would appear that the deaths accounted for fall short of the probable actual death-rate about ten per cent, it should be noted that during the year about 5,000 more deaths were reported than in 1884. This was not due to a higher rate of mortality but to greater completeness of returns and increase in the number of local boards of health organized.

The 10,000 deaths that are not accounted for fail of record partly from the lack of complete organization of all local boards throughout the State and partly from incompleteness in the returns of some that are organized. Reference to the bulletins will show that the death-rate per 1,000 of many localities is habitually so low as to make it evident that their returns are incomplete. Of all the returns of vital statistics, the death returns are most feasible of collection, and although it is the universal experience that absolute completeness is not met with, yet with our explicit laws it requires only sufficient energy on the part of the local officers to secure them very fully in this State. The efforts of this board in several marked instances have been followed by great improvement. As to the shortage due to non-organization of local town boards of health, the number and locality of which towns have already been referred to, it may be said that there is pretty steady improvement in this respect, and the efforts of the board are being constantly exerted in this direction. The organization and perfection of such work requires time and established habit, and is interfered with by the annual change in the local elective officers who are made the components of local boards.

But more could not be expected than has been accomplished during the short existence of the present system of sanitary management established in this State. The system fails in that it requires so large dependence upon local workers, but is admirable to a more then compensating degree in placing the administrative and executive work of protecting the public upon the towns directly under the advisory supervision of the central board, and experience abundantly shows that as one of its points of advantage, the work of registry and collection of vital statistics is important in keeping up the local organization and work, and its perfectness answers as a barometer of the general activity of the local board.

The *sanitary condition of the State* is exhibited by the monthly bulletins and the summary of them which has been given. Of the entire reported mortality about one-third was of children under five years of age. This was highest during the summer months, from diarrhœal disease, especially in July, when more than half the deaths occurred under this age.

For the entire State the ratio per 1,000 of deaths from zymotic diseases to the total mortality is 222.17. It was highest in the summer months and September. The zymotic death-rate was considerably higher in the Maritime district than in other parts of the State, and next to that is the Hudson Valley district, showing the relative preponderance of deaths from these causes in the urban over the rural population. This measure of healthfulness compared with the year preceding shows that the proportion of the preventable diseases to the total mortality is as 222.17 to 269.12, which was the zymotic death-rate for nine months of 1884. This diminution appears to have been, as the secretary shows in his report, largely in typhoid and diarrhœal diseases. In 1885 the conjoined ratio of deaths from these diseases per 1,000 total mortality was 104.07 against 146.40 in 1884. As these are the special filth diseases that are controllable by public hygienic improvements, it may be inferred that the result is at least in part the fruit of what has been done by organized sanitary work. As the secretary further indicates, this received additional emphasis from the fact that diphtheria which is more often to be traced to insanitary conditions of domiciles and premises instead of those of a more public nature and influence, was increased in the proportion of 56.06 deaths per 1,000 total deaths in 1885 to 47.65 per 1,000 in 1884.

During the early months of the year there was a very considerable and general prevalence of measles. Epidemics occurred from it in all parts of the State. Corresponding with it in time was the development of scarlet fever to a greater extent than later in the year, not, however, to an unusual degree.

Typhus fever fortunately appeared nowhere in the State in 1885, outside of the large cities that are beyond the jurisdiction of the board. It has existed in New York and Brooklyn to a moderate degree through the year, the total number of deaths from it being eighteen. In December it made its appearance in Albany, in the

county penitentiary, and seven deaths occurred. Efforts are being made to trace its origin, and there is good reason to believe that its duration as an epidemic there will be short and unattended with spread of the disease outside of the institution. Small-pox has fallen more lightly upon the State than was with good reason anticipated in view of its alarming development in the neighboring city of Montreal. Repeated notices of warning and information was sent to all border towns and along all lines of railroad leading from Canada. Instructions were given as to embargo, quarantine and the protection of vaccination, all of which, with the train inspections afforded by the national government and the assistance of a healthy rousing of the popular mind, has doubtless secured our immunity. Vaccination has never been so general and never so satisfactorily done nor with so uniformly good vaccine virus. In some reports from town boards it appears that every individual has been offered vaccination. It is gratifying to the committee to note the readiness of the people generally to submit to this, as they are convinced that if it were universal its protection would be so complete that not another death from this disease would appear upon the bulletin of mortality of the State. It should be of all the preventable diseases the least to be feared because it is the only one that is absolutely preventable.

From consumption the ratio of mortality is quite uniform, presenting no marked variation either as to locality or as to time. The proportion of deaths to the total mortality was largest in the winter and spring months. The death ratio was smallest in the Southern Tier district and highest in the West Central district, there being in the latter about 155 deaths to the 1,000 total mortality. The next highest ratio is found in the Adirondack and Northern district. There may be a significance in this, pointing to the dependence of this disease often on a high level of ground water. In the last-mentioned district there is to be sure a favorite and for many cases desirable health resort for those afflicted with this disease, but in its large area is much flat soil-saturated territory. The same is true of some parts of the West Central district. No general sanitary improvement will do more to lessen this disease, which uniformly causes about fourteen per cent of the total mortality, and which has much that allies it with the preventable diseases, than the one which will secure drainage of the soil upon which habitations are constructed.

During the first five months of the year there was a remarkable prevalence of acute respiratory disease. Pneumonia especially caused a large mortality.

Of other causes of death, little needs to be said, as far as the precautions for prevention of disease by the machinery of health boards is concerned. The frequency of those which are more interesting to study, as well as their distribution, may be learned by reference to the monthly bulletins and the annual summary. This publication, while a constant source of information to the central office as to the conditions and tendencies of all localities of the State regarding their sani-

tary condition, also is of informing and inspiring value to the local boards as to their real and comparative healthfulness and at the same time an accumulation of data of value to the statistician and the student of sanitary science.

G. W. COOKE, M. D.,
Chairman.

AN ACT

For the preservation of the public health, and the registration of vital statistics.

Chapter 270. Passed May 12, 1885; three-fifths being present.]

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. It shall be the duty of the common council, upon the nomination of the mayor of every city in this State, except in the cities of New York, Buffalo, Albany and Yonkers and Brooklyn, which are hereby excepted from the operation of this act, to appoint a board of health for such city, to consist of six persons who are not members of said council (one of whom, at least, shall be a competent physician), who shall be nominated and appointed as follows: two persons for a term of one year; two persons for a term of two years; and two persons for a term of three years. The mayor of such city shall be a member *ex-officio* of such board of health, and shall be president thereof. The said board of health, when duly organized, shall appoint a competent physician (not a member of such board), who shall be health officer for such city. Upon the expiration of the term of office of any member of the board of health, appointed as herein provided, his successor shall be nominated and appointed in like manner for the term of three years; and the said mayor and common council shall also have power to fill any vacancy caused in such board of health by the death, resignation or removal from the city of any member thereof. And it shall be the duty of the trustees of every incorporated village in this State to appoint, once in each year, a board of health of such village, to consist of not less than three nor more than seven persons (who are not village trustees), who shall hold office for one year, or until their successors shall have been appointed. The said board of health thus constituted shall elect a president, and appoint a competent physician (not a member of such board) to be the health officer of such village. This section shall not be construed to remove any of the existing boards of health in any of the cities or villages of this State, but the successors of such boards shall be appointed as in this section provided.

Constitution of City Boards of Health.

Health Boards of villages.

§ 2. It shall be the duty of the supervisor, the justices of the peace and the town clerk in each town in this State, to meet in their respective towns within thirty days from the date of the town election in each year and elect a citizen of such town of full age, who with them shall constitute the board of health for such town for one year or until their successors are chosen. The said board of health shall appoint some competent physician, not a member of said board, to be the health officer for such town. If in any case a vacancy shall occur in the board of health of any city, village or town, by the death, resignation, inability to act or removal from said

Membership and organization of town Boards of Health.

city, village or town of any member thereof, and if the proper authorities, by inability, neglect or refusal, fail to fill such vacancy, it shall be the duty of the county judge of the county in which such city, village or town is situated, upon being satisfied that such vacancy should be filled without delay, to appoint in writing a competent person to fill such vacancy for the unexpired term. The written appointment to a board of health made by a county judge under this section shall forthwith be filed in the office of the clerk of the county in which said board of health is located. Notice of the membership and organization of all boards of health in this State and of all changes that may from time to time occur therein shall be given forthwith to the State Board of Health.

Temporary vacancies, how filled.

§ 3. The several boards of health now organized in any city, village or town in this State (except in the cities of New York, Brooklyn and Buffalo), and the several boards of health constituted under this act shall have power and it shall be their duty:

Powers and duties of Health Boards.

1. To meet at stated intervals in their respective cities, villages and towns; also, whenever the State Board of Health, or the president and secretary thereof, shall, by notice to the presiding officer of any city, village or town board of health, request him to convene such board to take certain definite proceedings upon matters concerning which the said State Board of Health, or its president and secretary, shall be satisfied that the action recommended by them is necessary for the public good, and is within the jurisdiction of such board of health. Any willful violation of any lawful instruction of said State Board of Health shall be a misdemeanor.

In relation to meetings.

2. To prescribe the powers and duties of the local health officer, who shall act as executive officer of the board; to direct him from time to time in the performance of his duties, and to fix the compensation he shall receive.

In relation to health officer.

3. To guard against the introduction of contagious and infectious disease, by the exercise of proper and vigilant medical inspection and control of all persons and things arriving in such city, village or town from infected places, or which, for any cause, are liable to communicate contagion; to require the isolation of all persons and things infected with or exposed to contagious or infectious diseases, and to provide suitable places for the reception of the same; and, if necessary, to furnish medical treatment and care for sick persons who cannot otherwise be provided for; to prohibit and prevent all intercourse and communication with or use of infected premises, places and things; and to require, and, if necessary, to provide the means for the thorough purification and cleansing of the same before general intercourse therewith, or use thereof, shall be allowed. And it shall be the duty of every such board of health to report to the State Board of Health promptly facts which relate to infectious and epidemic diseases, and every case of small-pox or varioloid occurring within its jurisdiction; and to provide at stated intervals a suitable supply of vaccine virus of a quality or from a source approved by the State Board of Health; and during the existence of an actual epidemic of small-pox, said local board of health shall obtain fresh supplies of said virus at intervals not exceeding one week, and shall at all times provide thorough and safe vaccination for all persons within its jurisdiction who may need the same.

In reference to contagious and infectious diseases.

To provide medical treatment for sick.

To regulate isolation of and intercourse with infected persons and places.

To report to State Board of Health.

To provide for public vaccination.

To receive complaints of inhabitants.

4. To receive and examine into the nature of complaints made by any of the inhabitants concerning nuisances, or causes of danger or injury to life and health within the limits of its jurisdiction; to enter upon or within any place or premises where nuisances or conditions dangerous to life and health are known or believed to exist, and by appointed members or persons to inspect and examine the same; and all owners, agents and occupants shall permit such sanitary examinations; and said board of health shall furnish said owners, agents and occupants a written statement of results or conclusions of such examinations; and every such Board of Health shall have power, and it shall be its duty, to order the suppression and removal of nuisances and conditions detrimental to life and health found to exist within the limits of its jurisdiction.

To enter upon premises and places for sanitary examination.

To supervise and complete the registration of vital statistics.

5. To supervise and make complete the registration of all births, marriages and deaths occurring within the limits of its jurisdiction in accordance with the methods and forms prescribed by the State Board of Health, and to secure the prompt forwarding of the certificates of birth, marriage and death to the State Bureau of Vital Statistics after local registration; and in so completing the said registration the cost thereof shall be a charge upon such city, village or town, and shall not exceed fifty cents for each completely verified and registered record of birth, marriage or death. And to secure the completeness of the said registration it shall be the duty of the parents or custodian of every child, and the groom at every marriage, or the clergyman or magistrate performing the ceremony, to secure the return of the record of such birth or marriage to the Board of Health or person designated by them within thirty days from the date of such birth or marriage, and each record shall be duly attested by the physician or midwife (if any) in attendance at such birth, or the clergyman or magistrate officiating at such marriage. And it shall be the duty of the health officer of every such Board of Health to receive and examine and secure the registration of all certificates and records of death and causes of death and findings of coroners' juries, and said Board of Health shall designate the persons who shall grant burial permits for the burial of the dead, and transit permits for the transportation of the dead bodies of persons which are to be carried for burial beyond the limits of the county where the death occurs; and it shall be the duty of the undertaker, sexton or other person having charge of the body of any dead person to procure a record of the death and its probable cause duly certified by the physician in attendance on the deceased during his last illness or by the coroner where an inquest is required by law; and there shall be no burial nor removal of the body of any dead person until said duly certified record shall have been presented to the Board of Health or person designated by them, and until thereupon a permit for burial or transit shall have been obtained. And the said Board of Health shall prescribe sanitary regulations for such burials and removals of the dead. It shall also be the duty of every such Board of Health to provide for obtaining copies of the said registered records of births, marriages and deaths, and for the amount and payment of fees for such copies. Such copies, duly attested by the local registering officer, and verified transcripts from the records preserved in the State Bureau of Vital Statistics shall be admitted in all the courts of this State as *prima facie* evidence

Cost per record not to exceed fifty cents.

Duty of parents or custodians grooms, clergymen, magistrates, physician and midwife.

Undertaker to procure record of death.

No burial or removal without permit.

Verified transcript of records prima facie evidence.

of the facts therein set forth. If in any place in this State, the State Board of Health ascertains that the said registration of births, marriages and deaths is not completely and well made, said State Board shall notify the local Board of Health in such place, that within one month from the date of such notice, said defects and neglect in the records must be amended and prevented. If at the expiration of the time mentioned the said defects and neglect are not overcome and prevented by the said local authorities, it shall be the duty of the said State Board of Health to take control of the said records, and enforce the rules and regulations with reference thereto, and secure their completeness and proper registration within the limit of cost hereinbefore specified, and to continue such control until the said local Board of Health shall satisfy the said State Board of Health that they will actually make the said records and registry complete as required by law. Any person neglecting or refusing to make out or file for registration any record as aforesaid, and any person causing, permitting or assisting in the burial or removal of any dead body, unaccompanied by a permit for such burial or removal, duly issued by the local Board of Health having jurisdiction where the death occurred, and any officer or board that shall neglect or refuse to register and preserve the said records and forward the certificates to the State Bureau of Vital Statistics as above required shall be deemed guilty of a misdemeanor and may be prosecuted in any court of competent jurisdiction.

State Board of Health shall take control to remedy neglects and enforce compliance for a time.

Neglect or refusal to make out or file a record, or the burial or removal of a dead body a misdemeanor.

6. To make, and from time to time to publish, in such manner as to secure early and full publicity thereto, all such orders and regulations as they shall think necessary and proper for the preservation of life and health and the successful operation of this law; and to make, without publication thereof, such orders and regulations in special or individual cases, not of general application, as they may see fit concerning the suppression and removal of nuisances, and concerning all other matters in their judgment detrimental to public health, and to serve copies thereof upon any occupant or occupants and the owner or owners of any premises whereon any such nuisances or other matters aforesaid shall exist, or to post the same in some conspicuous place on such premises.

Orders and regulations to be published.

7. To issue warrants to any constable or police of their respective cities, villages and towns, to apprehend and remove such persons as cannot otherwise be subjected to the orders and regulations by them adopted; and whenever it shall be necessary to do so, to issue their warrant to the sheriff of their respective counties to bring to their aid the power of the county; all which warrants shall be forthwith executed by the officers to whom they shall be directed, who shall possess the like powers and be subject to the like duties in the execution thereof, as if the same had been duly issued out of any court of record in this State.

Power to issue warrants.

8. To employ all such persons as shall be necessary to enable them to carry into effect the orders and regulations they shall have adopted and the powers vested in them by this act, and to fix their compensation.

Employment of agents.

9. To impose penalties for the violation of, or non-compliance with, their orders and regulations, and to maintain actions in any court of competent jurisdiction to collect such penalties, not exceeding one hundred dollars in any one case, or to restrain by injunctions such violations, or otherwise to enforce such orders and regulations.

Board of Health may impose penalties or restrain violations by injunctions.

§ 4. Every person who shall willfully violate or refuse to obey any order or regulation made and published by the Board of Health of any city, village or town in this State, or any order made and served, or posted as aforesaid, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be subject to fine or imprisonment, or both, in the discretion of the court, such fine not to exceed one thousand dollars nor such imprisonment six months. And in any case of non-compliance with any order or regulation which shall have been served or posted, as provided in subdivision six of section three of this act, the said board or its servants or employees may lawfully enter upon any premises to which such order or regulation relates, and suppress or remove the nuisance or other matters in the judgment of said board detrimental to the public health mentioned in such order or regulation, and any other nuisance or matter of the description aforesaid found there existing; and the expense thereof shall be a charge upon the occupant or any or all of the occupants of said premises, or upon the person or persons who have caused or maintained the nuisance or other matter of the description aforesaid, and may be sued for and recovered with costs by said board in the name of such board in any court having jurisdiction. Whenever execution upon any judgment so obtained shall have been returned wholly or in part unsatisfied, said judgment, for the amount so unsatisfied, shall be a lien upon said premises, having preference over all other liens or incumbrances whatsoever. But in order to acquire such lien, such judgment, if in a court not of record, shall first have been docketed in the same place and manner as by law now required to make judgments in such courts liens upon real estate. And whenever any lien upon any premises shall have become fixed as aforesaid, the said board may cause the said premises to be sold at public auction, for a term of time, for the payment and satisfaction of such lien, and the expenses of such sale, giving notice of such sale for twelve weeks successively, once in each week, in one or more newspapers published in the city, incorporated village or town where the premises are situated, as the case may be; or if no newspaper be published in such village or town, then in the newspaper published nearest said premises, and also serving a copy of such notice of sale personally on the owner or agent of said premises, if known, and a resident of said city, village or town, at least fourteen days previous to such sale, or by depositing the same in the post-office, directed to such owner or agent at his place of residence if known, or the nearest post-office thereto, at least twenty-eight days previous to such sale. And the said premises shall be sold to the person who shall offer to take the same for the shortest time, paying the amount remaining unpaid upon such judgment, with interest, and the expenses of such notice and sale. A certificate of such sale, signed by the president and countersigned by the secretary of such board, shall thereupon be made and delivered to the purchaser, and may be recorded in like manner and with like effect as deeds of conveyance of lands, and thereupon the purchaser, his heirs or assigns, shall be entitled to the possession of said premises so sold as aforesaid, and if unoccupied may immediately enter, and if occupied may have remedy against any occupant by action or by summary proceedings as against a tenant holding over after expiration of his term; and in case the costs of such action or proceeding shall not be collected by such purchaser of the defendant therein, the same shall be a lien upon said premises, having the like preference as the lien aforesaid, and the term of the said purchaser shall be extended during

Violating orders of the Board a misdemeanor.

Penalty.

Power to enter upon premises and suppress nuisances.

Unsatisfied judgment a lien upon the premises.

Sale of premises at public auction.

Certificate of sale.

a time bearing the same proportion to the original term as the amount of such cost bears to the amount paid by such purchaser on such sale. And such term shall commence when such purchaser shall have acquired possession. At any time after such sale and within six months after the recording of such certificate as aforesaid, the owner or any lienor or incumbrancer of such premises, or of any part thereof, may redeem by paying to the purchaser the amount paid by him on such sale, and all costs and expenses he may have incurred in any action or proceeding as aforesaid, to obtain possession, with ten per cent interest thereon. If such redemption be made by the owner, the right of the purchaser shall be extinguished; and if by such lienor or incumbrancer, the amount paid by him to redeem shall be added to his lien or incumbrance, or if he have more than one, to the oldest, and shall thenceforth partake of the nature thereof and be collectible by any remedy adapted thereto.

Expenses of Boards of Health to be a town, village or city charge, how audited and paid.

§ 5. All expenses incurred by the several boards of health in the execution and performance of the duties imposed by this act shall be a charge only on their respective cities, villages and towns; and shall be audited, levied, collected and paid in the same manner as other city, village and town charges are audited, levied, collected and paid.

Persons sick of infectious disease may be removed from county poor-house.

§ 6. Whenever any pestilential, or infectious or contagious disease shall exist in any county poor-house in this State, or in the vicinity of any such county poor-house, and the physician of such county poor-house shall certify that such pestilence or disease is likely to endanger the health of the persons supported at such poor-house, the superintendent of such county poor-house shall have power to cause the persons supported at such poor-house, or any of them, to be removed to such other suitable place in the same county as shall be designated by the Board of Health of the city, town or village within which such poor-house shall be situated, there to be maintained and provided for at the expense of the county, with all necessary medical care and attendance, until they shall be safely returned to the county poor-house from which they were taken, or otherwise discharged.

Village Boards and villages not taxed to support town sanitary improvements, nor towns to support village Boards of Health and their work.

Provision for combined sanitary and registration districts.

§ 7. Any legally organized Board of Health in an incorporated village, which comprises parts of several towns, or less than a whole town, shall have full authority in regard to all matters relating to public health within said village, and such village shall not be subject to the sanitary regulations or health officers of the township or towns within which such village is located; nor shall the taxable property of any such village, while maintaining its own Board of Health, be subject to taxation for maintaining any town Board or Boards of Health, or for any expenditures authorized by such town boards; but such expenditures of the town Boards of Health shall be assessed and collected exclusively on property in the town outside of said village. But nothing in this act shall be construed to prevent the boards of health of two or more towns adjacent to each other or of towns and villages therein situated from uniting in a combined sanitary and registration district by the appointment of one health officer and registering officer for such district, whose authority in all matters of general application shall be derived from the several Boards of Health having jurisdiction within such district; and in special cases, not of general application, arising within the jurisdiction of any such Board of Health the said officers shall derive their authority from such board alone. Such combined districts shall be formed subject to the approval of the State Board of Health.

§ 8. Any duty prescribed or enjoined by this act upon any local Board of Health, or any member or officer thereof, or upon the common council of any city or any member thereof, or upon the board of trustees of any village or any member thereof, or upon any officer of any city, village or town may be enforced by a mandamus at the instance of the State Board of Health, its president, secretary or any member thereof.

State Board may enforce duty upon local Boards by mandamus.

§ 9. Chapter one hundred and fifty-two of the laws of eighteen hundred and forty-seven, chapter three hundred and twenty four of the laws of eighteen hundred and fifty and the several acts amendatory thereof, chapter five hundred and twelve of the laws of eighteen hundred and eighty, except subdivision thirty-four of section one of said act, and all other acts or parts of acts, general or special, inconsistent with the provisions of this act are hereby repealed.

[No. 53.]

SANITARY REGULATIONS.

Adopted by the Board of Health of——————

Nuisances defined.

SECTION 1. Whatever is dangerous to human life or health; whatever building, or part or cellar thereof, is overcrowded or not provided with adequate means of ingress and egress, or is not sufficiently supported, ventilated, sewered, drained, lighted or cleaned; and whatever renders soil, air water or food impure or unwholesome, are declared to be nuisances and to be illegal; and every person having aided in creating or contributing to the same, or who may support, continue or retain any of them, shall be deemed guilty of a violation of this ordinance, and shall also be liable for the expense of the abatement or remedy required.

Privies, cess-pools, etc.

§ 2. No privy-pit, cess-pool or reservoir into which any privy, water-closet, stable, sink or other receptacle of refuse or sewage is drained, shall be constructed or maintained in any situation or in any manner whereby, through leakage or overflow of its contents, it may cause pollution of the soil near or about habitations, or of any well, spring or other source of water used for drinking or culinary purposes, nor shall the overflow from any such reservoir or receptacle be permitted to discharge into any public place or in anywise whereby danger to health may be caused. And every such pit, reservoir or receptacle shall be cleaned and the contents thereof removed at such times and under such precautions as the board of health may prescribe. Violation of any of the provisions of this ordinance shall be punished by a fine of.... ...for each day's continuance of the nuisance after due notice to abate it from an authorized officer.

Sewers, drains, etc.

§ 3. All house-sewers or drains for the conveyance of deleterious or offensive matters shall be water-tight, and the plans and methods of their construction shall be subject to the approval of the board of health. In streets or avenues where public sewers are or shall be constructed, the board of health may order house-connections to be made therewith.

House refuse, garbage, etc.

§ 4. No house-refuse, offal, garbage, dead animals, decaying vegetable matter, or organic waste-substance of any kind, shall be thrown upon any street, road or public place, and no putrid or decaying animal or vegetable matter shall be kept in any house, cellar or adjoining outbuilding for more than twenty-four hours. Violation of any of the provisions of this ordinance shall be punished by a fine of........

Filled-in or made land.

§ 5. No sunken places shall be filled, nor made land constructed, with any materials containing an admixture of putrescible animal or vegetable matter, under penalty of not less than........nor more than....... for each cart-load, or part thereof, of such materials deposited

Noxious trades.

§ 6. No person or company shall erect or maintain any manufactory or place of business dangerous to life or detrimental to health, or where

n wholesome, offensive or deleterious odors, gas, smoke, deposit or exhalations re generated, without the permit of the board of health, and all such establishments shall be kept clean and wholesome so as not to be offensive or prejudicial to ublic health; nor shall any offensive or deleterious waste-substance, gas-tar, ludge, refuse or injurious matter be allowed to accumulate upon the premises or e thrown or allowed to run into any public waters, stream, water-course, street or ublic place. And every person or company conducting such manufacture or usiness shall use the best approved and all reasonable means to prevent the escape of smoke, gases and odors, and to protect the health and safety of all operatives employed therein. Any violation of any of the provisions of this ordinance shall be punishable by a fine of not less than ten dollars nor more than one hundred dollars for each offense.

§ 7. No meat, fish, bird, fruit, or vegetables, milk, or any thing for human food or drink, not being then fresh or properly preserved, sound, wholesome and safe for such use; nor any flesh of any animal which died by disease, or which was at the time of its death in a sickly or unwholesome condition; nor the carcass or meat of any calf which was at the date of its death less than four weeks old, or of any lamb which was at the date of its death less than eight weeks old, or of any pig which was at the date of its death less than five weeks old shall be brought within the limits of this.... ...nor offered or held for sale as food therein. Any violation of any of the provisions of this ordinance shall be punishable by a fine of not less than .... and by the seizure and destruction of such unsound, unwholesome, or immature food substances. Unwholesome food.

§ 8. No person or persons, without the consent of the board of health, shall build or use any slaughter-house within the limits of this......; and the keeping and slaughtering of all cattle, sheep and swine, and the preparation and keeping of all meat, fish, birds, or other animal food, shall be in the manner best adapted to secure and continue their wholesomeness as food; and every butcher or other person owning, leasing or occupying any place, room or building wherein any cattle, sheep or swine have been or are killed or dressed, and every person being the owner, lessee or occupant of any room or stable wherein any animals are kept, or of any market, public or private, shall cause such place, room, building, stable or market, and their yards and appurtenances, to be thoroughly cleansed and purified, and all offal, blood, fat, garbage, refuse and unwholesome and offensive matter to be removed therefrom at least once in every twenty-four hours after the use thereof for any of the purposes herein referred to, and shall also at all times keep all woodwork, save floors and counters, in any building, place or premises aforesaid thoroughly painted or whitewashed; and the floors of such building, place or premises shall be so constructed as to prevent blood or foul liquids or washings from settling in the earth beneath. Any violation of any of the provisions of this ordinance shall be punished by a fine of........for each day's continuance or repetition of the offense. Slaughter-houses, markets, etc.

§ 9. Every householder or head of family in a house wherein any case of infectious disease may occur shall report the same to the board of health or to the health officer within twelve hours from the time of his or her first knowledge of the nature of such disease; and, until instructions are received from the said board or the health officer, shall not permit any clothing or other article which may have been exposed to infection to be removed from the house; nor shall any occupant change his residence elsewhere without the consent of the said board or health officer. Notification of infectious disease.

Every physician who may be called to attend a case of infectious disease shall,

as soon as he discovers the nature thereof, make a written report specifying the name and residence of the patient, the nature of the disease, and any other facts relating thereto which he may deem important to the public health, and affix the date and sign his name thereto, and he shall hand such report to the householder or head of family as aforesaid, who shall thereupon become responsible for its transmission to the board of health within twelve hours as above provided. The diseases to be thus promptly reported are: Asiatic cholera, yellow fever, typhus and typhoid fevers, small-pox, scarlet fever, measles, and diphtheria. Any violation of any of the provisions of this ordinance shall be punished by a fine of........

§ 10. No person or article liable to propagate a dangerous disease shall be brought within the limits of this........unless by the special permit and direction of the board of health; and any one having knowledge that such person or article has been brought within such limits shall immediately notify the said board thereof. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than........nor more than ... ... Importation of infected persons or things.

§ 11. No person shall, within the limits of this..........unless by permit of the board of health, carry or remove from one building to another any patient affected with any contagious or infectious disease. Nor shall any person, by any exposure of any individual so affected, or of the body of such individual, or of any article capable of conveying contagion or infection, or by any negligent act connected with the care or custody thereof, or by a needless exposure of himself or herself, cause or contribute to the spread of disease from any such individual or dead body. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than........... Exposure of infected persons or things.

§ 12. There shall not be a public or church funeral of any person who has died of Asiatic cholera, small-pox, typhus fever, diphtheria, scarlet fever or measles, without the permit of the board of health therefor; and the family of the deceased shall in all such cases limit the attendance to as few as possible, and take all precautions possible to prevent the exposure of other persons to contagion or infection. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than........ Funerals after infectious diseases.

§ 13. No animal affected with an infectious or contagious disease shall be brought or kept within the limits of this........except by the permission of the board of health; and the bodies of animals dead of such disease, or killed on account thereof, shall not be buried within five hundred feet of any residence, nor disposed of otherwise than as the said board or its health officer shall direct. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than........ Infectious diseases of animals.

§ 14. It shall be the duty of the groom in every marriage and of the parent or custodian of every child born, to make sure that the prescribed report of such marriage or birth is presented to the board of health or its registering officer within thirty days, under a penalty of..........for failure to do so; and for each ten days of continued neglect to present such report, after the expiration of the first thirty days, an additional penalty of..........shall be incurred. Report of marriages and births.

§ 15. Every undertaker or other person who may have charge of the funeral of any dead person, shall procure a properly filled-out certificate of the death and its probable cause, in accordance with the form prescribed by the State Board of Health, and shall present the same to the desi- Certificates of death and burial permits.

nated officer or member of the board of health, and obtain a burial or transit permit thereupon, at least twenty-four hours before the time appointed for such funeral; and he shall not remove any dead body until such burial or transit permit shall have been procured. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than........

§ 16. Every person who acts as a sexton, or undertaker, or cemetery keeper, within the limits of this .... ..or has the charge or care of any tomb, vault, burying ground or other place for the reception of the dead, or where the bodies of any human beings are deposited, shall so conduct his business and so care for any such place above named, as to avoid detriment or danger to public health; and every person undertaking preparations for the burial of a body dead from contagious or infectious disease as hereinbefore enumerated shall adopt such precautions as the board of health may prescribe to prevent the spread of such disease. Any violation of any of the provisions of this ordinance shall be punished by a fine of not less than........ Sextons, cemetery keepers, etc.

§ 17. Before the holding of any inquest within this........the coroner, who may intend to hold such inquest shall notify the board of health or the health officer of the place where the body is; what is reported to have been the cause, place, and date of death; where the body has since been; when and where the proposed inquest is to be held; and, if known, what physician attended the deceased person within forty-eight hours of such decease. And within forty-eight hours after the termination of such inquest such coroner shall cause to be transmitted to the board of health or to the health officer a certificate according to the form prescribed by the State Board of Health, supplying the data therein required to the best of his information and belief. Any violation of any of the provisions of this ordinance shall be punished by a fine of........ Coroners' inquests.

§ 18. The health officer is directed and empowered to execute and enforce all sanitary regulations of general obligation now or hereafter to be published by this board; also to enter upon or within any premises where conditions dangerous to the public health are known or believed to exist, and to examine into the nature of complaints made by any of the inhabitants concerning sources of danger or injury to health; and he shall preserve accurate records of his official actions and report the same to the board of health at its next meeting. And whenever in his judgment danger to public health shall arise requiring special regulation not of general application, he shall forthwith notify the president of the board of health, who shall thereupon convene the board to take such action as may be necessary and proper. Duties and powers of health officer.

§ 19. Every person who willfully violates or refuses to comply with, or who resists any ordinance, order, regulation or resolution of the board of health of this........will be liable to the arrest, action, penalty, fine and punishment provided and declared in chapter 270 of the Laws of 1885, of which notice must be taken. Penalties.

RECORD OF STILL-BIRTHS.

Date of birth.	Sex.	Color.	Month of pregnancy.	Cause of dead birth (if known).	Name of mother.	Nativity of mother.	Residence.	Name of person making return.	Undertaker.	Place of burial.

MONTHLY BULLETINS

OF THE

NEW YORK STATE BOARD OF HEALTH.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during January, 1885.

[Cities are printed in small capitals, villages in italics and towns in Roman type. The populations preceded by a star (*) are estimated to date; the remainder are from the census of 1880.]

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,895	2,965	25.46	1,197	43.7	25	1	16	24	0	72	150	22	28	178	64	195.62	532	475	41	137	213	164	261	55	62	209	336
BROOKLYN	*665,602	1,143	20.60	410	35.7	0	1	7	17	0	25	12	0	12	91	7	150.48	149	177	14	70	54	59	110	26	23	24	165
Gravesend	*5,000	5	12.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	1	0	1	1	0	0	0	0
New Lots	*18,000	26	17.33	12	46.16	1	0	0	2	0	0	0	0	0	2	0	192.30	6	7	0	0	0	0	1	1	0	3	3
New Utrecht	4,742	4	10.12	2	50.0	0	0	0	0	0	2	0	0	0	0	0	500.00	0	0	0	0	0	2	0	0	0	0	0
Flatlands	3,127	7	26.86	1	14.3	0	0	0	1	0	1	0	0	0	0	0	285.71	0	1	0	0	0	0	1	0	2	1	0
LONG ISLAND CITY	*21,000	32	18.29	11	34.4	1	0	0	0	0	0	0	0	0	3	0	125.00	6	5	0	2	4	2	3	0	3	1	2
Newtown	*10,000	21	25.20	9	42.9	0	0	0	0	0	0	0	0	0	4	0	190.48	4	3	0	1	1	0	6	0	0	1	1
Oyster Bay	*12,000	16	16.00	1	6.2	0	0	0	0	0	0	0	0	0	0	1	62.30	2	2	0	0	0	1	0	1	0	2	7
Hempstead	18,160	8	4.00	1	16.7	0	0	0	1	0	0	2	0	0	0	0	166.66	0	0	0	0	1	0	1	0	0	3	0
North Hempstead	*7,000	10	17.14	5	50.0	1	0	0	0	0	0	0	0	0	1	0	400.00	2	2	0	1	0	0	0	0	0	1	0
Sag Harbor	*3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	0	0	0	0	1
Babylon	4,739	9	22.79	2	22.2	0	0	0	0	0	0	0	0	0	0	0	....	2	0	1	0	1	1	4	0	0	0	0
Southold	7,267	2	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	1
Southampton	6,352	9	17.00	1	11.1	0	0	2	0	0	1	0	0	0	0	0	333.33	1	0	0	0	0	0	4	0	0	1	0
Northfield	7,014	8	13.80	2	25.0	0	0	0	0	0	0	0	0	0	1	1	250.00	2	2	0	0	0	1	0	1	0	0	0
Westfield	5,289	7	15.88	1	14.3	0	0	0	0	0	0	0	1	0	0	0	142.86	1	2	0	0	0	0	1	0	0	0	2
YONKERS	*22,000	37	20.18	11	29.7	0	0	0	0	0	4	0	0	0	0	1	133.33	8	7	0	0	0	0	3	1	1	2	10
Westchester	*6,900	10	17.40	1	10.0	1	0	0	0	0	0	0	0	0	0	0	100.00	3	1	0	1	0	2	0	0	2	0	0
Rye	*7,500	4	6.40	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	2	1	0	0	1	0
Sing Sing	*6,500	13	24.00	1	7.7	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	2	3	5	0	0	0	0
Rest of district	....	32	....	8	25.0	0	0	0	0	0	0	0	0	0	4	2	187.50	7	6	0	1	0	2	4	1	1	2	2
HUDSON VALLEY DIST.:																												
ALBANY	*99,495	162	19.54	32	20.0	1	0	6	0	0	0	0	0	0	11	4	135.80	19	34	0	12	6	14	29	5	4	5	12
COHOES	*20,000	38	22.80	16	42.10	1	0	2	2	0	1	1	0	0	3	0	363.16	8	5	0	3	0	4	4	0	0	2	2
West Troy	[illegible]	16	14.84	7	43.8	0	0	0	0	0	1	0	0	0	1	0	125.00	6	2	0	0	0	1	2	0	0	1	2
Hoosick Falls	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	....	0	1	0	0	0	0	1	0	0	0	0
[illegible]	13,000 / *4,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]											

TROY	*60,000	84	16.80	24	28.6	0	0	3	1	0	0		0		0	0	184.76	16	13	1	3	2	11	18	2	0	2	4
Lansingburgh	*8,500	27	39.53	8	28.6	0	0	1	0	0	3	0	0		8	1	464.28	0		0	0	2	3	2	0	1	2	0
Green Island	*5,000	10	24.00	2	20.0	0	0	0	0	0	0			0	0	0	....	4	3	0	0	1	0	0	0	1	0	1
Greenbush	*7,000	12	20.57	4	33.0	0	0	0	0				0	0	0		....	3	0	0	3	0	0	1	0	3	1	1
Catskill	*4,500	17	45.33	8	47.0	0	0	0	0		1	0	0	0	4		352.94	2	4	0	2	0	1	0	0	2	0	0
HUDSON	*10,000	15	18.00	6	40.0	0	0		0	0	0	0	0	0	3		200.00	0	4	0	0	2	1	2	0	0	0	3
KINGSTON	20,000	54	32.40	15	27.8	1			3	0	0	0	0	4	7		462.96	4	10	3	2	2	5	1	0	0	0	2
Wawarsing	8,347	9	12.70	1	11.1	0			0	0	0	0	0	0	1	0	222.22	0			0	1	2	1	0	0	1	0
Rosendale	5,000	1	2.40	1	100.0	0			0	0	0	0	0	0	1	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Marbletown	4,000	6	18.00	0	......	0	0		0	0	0	0	0	0	0	0	333.33	1	0	0	0	0	0	0	0	1	1	1
POUGHKEEPSIE	20,267	29	17.25	5	17.2	0	0	0	0	0	0	0	0	0	3	0	103.45	2	7	1	3	2	2	2	0	2	2	3
Fishkill	10,732	20	22.37	5	25.0	0	0	0	0	0	0	2		0	0	0	150.00	9	2	0	0	0	1	1	1	0	0	6
Wappinger's Falls	*5,000	4	9.60	0	......	0			0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	1	0	2
NEWBURGH	*20,000	25	15.00	3	12.0	0		1	0	0	0	0	0	0	0	0	40.00	5	6	1	3	2	2	1	1	0	1	2
Middletown	*10,000	15	18.00	4	26.6			0	0	0	0	0	0	0	0	0	....	2	6	0	1	0	1	1	1	0	0	3
Port Jervis	*8,800	8	11.00	2	25.0			0	0	0	0	0	0	0	1	0	125.00	0	1	0	0	1	0	2	0	1	1	1
Goshen	4,387	5	13.44	1	20.0			0	0	0	0	0	0	0		0	....	3	1	0		0	0	1	0	0	0	0
Orangetown	8,000	11	18.00	5	41.7			0	0	0	0	0	0	0			....	4	2	2		1	1	1	0	0	0	0
Ramapo	5,000	5	12.00	0	......	0		0	0	0	0	0	0	0			....	2	0	0	0	1	1	1	0	0	0	0
Haverstraw	7,000	12	20.57	6	50.0	0			0	0	0	0	0	0		0	....	2	1	0	0	0	0	5	1	1	0	2
Esopus	4,736	11	27.85	4	36.4				1	0	0	0	0			0	272.73	2	2	0	0	0	1	1	0	0	0	2
Saugerties	*4,000	8	24.00	0	......			0	0	0	0	0	0			0	....	2	3	0	0	1	0	2	0	0	0	0
Rest of district	....	173	....	33	19.0			3	2	0	3	2				1	127.16	42	17	4		7	10	29	2	7	16	11
ADIRONDACK & NORTHERN DISTRICT:																												
Greenwich	3,861	3	10.00	0	......	0	0	0	0	0	0	1		0	0	0	333.33	0	0	0	0	0	0	0	0	0	0	2
Sandy Hill	2,800	3	12.86	0	......	0		0	0	0	0	0		0	0	0	....	1	1	0	0	0	0	0	0	0	1	0
Fort Ann	3,262	4	11.04	0	......	0		0	0	0	0	0		0	0	0	....		0	0	0	1	1	1	0	0	0	0
Fort Edward	4,680	5	12.82	0	......	0	0	0	0	0	0	0		0	1	0	200.00		1	0	1	0	0	0	0	0	1	0
Queensbury	*10,000	17	24.00	11	52.0	1	0	1	0	0	0	0	0	5	0	0	350.00	0	3	0	0	1	0	5	0	0	0	1
Ticonderoga	8,304	3	10.91	1	33.3	0		0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	1	0	0	0	1
Malone	7,908	9	13.67	3	33.3	0		0	0	0	0	0	0	0	3	1	444.44	3	0	0	0	0	0	1	0	0	0	1
OGDENSBURG	*10,400	10	11.52	3	30.0	0	0	0	0	0	0	0	0	0	2	0	200.00	2	2	0	1	0	1	1	0	0	0	1
Gouverneur	*5,000	8	19.20	4	50.0	0	0	0	0	0	2	0	0	0	1	0	375.00	0		0	0	1	1	2	0	0	0	1
Adams	8,302	12	43.14	3	25.0	0	0	0	1	0	0	0	0	0	3	0	333.33			0	0	0	0	1	0	2	0	0
Ellisburgh	4,812	3	7.50	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0		0	0	0	0	0	1	0	0	0
WATERTOWN	*13,000	27	24.92	3	11.1	1	0	1	0	0	0	0	0	0	1	1	118.15	5		0	0	2	1	3	1	0	4	1
Rest of district	....	101	....	13	11.7	0	0	2	0	0	1	0	0	0	16	3	198.20	14	17	3	8	4	5	5	0	1	20	2
MOHAWK VALLEY DIST.:																												
SCHENECTADY	13,675	15	13.16	3	20.0	0	0	0	0	0	0	0	0	0	0	0	....	3	5	0	0	0	2	1		1	2	1
Middleburgh	3,376	4	14.22	1	25.0	1	0	0	0	0	0	0	0	5	0	0	250.00	2	1		0	0	0	0		0	0	0
Cobleskill	3,371	2	7.08	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0		0	0	0	0		0	2	0
Schoharie	3,330	4	14.82	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1		0	1	0
Amsterdam	*13,000	13	13.00	4	30.7	0	0		0	0	1	0	0	0	2	0	307.69	1	4	0	0	0	1	1		0	0	1
Johnstown	*6,000	5	10.00	1	20.0	0	0		0	0	0	0	0	0	0	0	200.00	2	1		0	0	0	0	0	0	0	1
Gloversville	*8,000	4	6.00	1	25.0	0	0	0	0	0	0	0	1	0	0	0	250.00	1	0		0	1	0	1	0	0	0	0
Little Falls	*7,300	5	13.33	1	20.0	0	0	0	0	0	0	0	0	1	0	0	200.00	1	0		0	1	1	0	0	0	1	0
Ilion	*4,500	3	8.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0		0	0	0	0	0	1	1	1
UTICA	*40,000	78	22.50	21	28.0	0	0	3	0	0	0	0	0	0	12	5	266.67	9	11			2	5	7	3	3	6	9
ROME	12,045	15	15.00	1	6.3		0	0	0	0	0	0	0	0	0	0	66.67	4	4			0	0	1	0	2	1	1
Boonville	4,000	10	30.00	4	40.0	0	0	0	0	0	0	0	0	0	6	0	600.00	1	1	0		0	0	0	0	0	1	1
Camden	3,400	6	21.18	2	33.3		0	0	0	0		0	0	0	2	0	333.34	0	1	0		0	0	1	0	0	0	1
Waterford	4,226	8	22.19	4	50.0		0	0	0	0		0	0	0	2	0	250.00	0	0	0	1	0	0	4	1	0	0	0
Milton	5,565	8	17.25	0	......	0	0	0	0	0		0	0	0	0	0	....	0	3	0	0	0	0	0	0	1	3	1

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST.:																												
Saratoga Springs	*10,000	21	25.20	4	19.0	0	0	0	0	0	0	0	0	0	0	1	47.62	2	3	0	2	0	4	6	1	0	0	2
Rest of district	....	77	....	8	10.4	0	0	3	1	0	0	1	0	0	4	0	116.88	12	16	1	2	4	3	8	5	0	8	9
SOUTHERN TIER DIST.:																												
BINGHAMTON	*20,000	29	17.40	7	24.1	0	0	0	1	0	2	0	1	0	0	0	137.93	3	3	1	3	2	3	6	1	1	1	1
Candor	4,323	8	22.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	3	1	0	0	0	1	1	1	0	1	0
ELMIRA.....................	*25,000	36	17.28	8	22.2	0	0	1	0	0	0	0	0	0	1	1	83.33	4	9	0	3	0	3	8	3	1	0	2
Horseheads	*3,500	5	17.14	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	1	1	1	0
Jamestown	*12,000	14	14.00	2	14.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	2	2	2	4	2	1	1	0	0
Westfield	3,500	4	13.71	0	......	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	0	0	0	0	0	3	0
Hornellsville.	*10,000	12	14.40	1	8.33	0	0	0	1	0	0	0	0	0	1	0	166.67	2	1	0	3	0	0	1	0	2	0	1
Bath	7,400	8	13.00	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00	3	1	0	0	0	1	1	0	0	1	0
Rest of district	....	23	....	4	17.4	0	0	0	0	0	2	0	0	0	1	0	130.43	9	0	0	1	0	1	1	2	0	2	4
EAST CENTRAL DIST.:																												
Walton	3,541	6	20.30	1	16.7	0	0	0	0	0	0	0	0	0	1	0	166.67	2	1	0	0	0	1	0	0	0	0	1
Delhi........................	3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	0	0	0	0	0	1
Cooperstown	*3,000	5	20.00	3	60.0	0	0	0	0	0	0	0	0	0	0	1	200.00	2	0	0	1	0	1	0	0	0	0	0
Oneonta.....................	*5,000	12	28.80	2	16.6	0	0	0	0	0	0	0	0	0	0	0	....	3	1	1	0	0	2	3	1	0	0	1
Worcester	*3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	1	0	0	0	0	0	0	0	0	0
Brookfield	3,685	7	22.75	0	......	0	0	0	0	0	0	1	0	0	0	0	142.86	3	0	0	0	1	0	0	0	0	2	0
Norwich	5,755	7	14.70	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	1	0	1	1	0	0	0
SYRACUSE	*65,000	90	16.80	22	24.2	3	0	1	1	0	0	0	0	0	4	0	98.90	16	14	1	7	1	12	7	2	4	2	15
Geddes	7,000	3	5.14	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	0	0	0	0	0	2	0
Salina.......................	*3,000	6	20.00	2	40.0	0	0	1	0	0	0	0	0	0	0	0	200.00	1	1	0	2	0	0	0	0	0	1	0
Skaneateles	*5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	1	1	0	0	0	0
Homer	*3,500	4	15.14	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	0	0	1	0	0
Rest of district	....	69	....	11	16.2	0	0	1	2	0	1	0	0	0	7	1	176.47	10	5	3	4	6	2	6	4	2	12	3
WEST CENTRAL DIST.:																												
AUBURN	*26,000	26	12.00	5	19.2	0	0	2	0	0	0	0	0	0	1	0	115.38	4	4	0	2	2	2	5	0	1	1	2
Groton	3,450	2	6.95	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	1	0	0
Seneca Falls	6,853	5	8.78	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	2	0	0	2	0	0	0	0
Ithaca	11,1[illegible]	9	9.65	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	2	2	2	0	0	1	1

Waterloo	*4,500	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	1	0	1
Hector	5,025	3	7.20	2	66.6	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	1	0	1	0	0
Canandaigua	*6,300	10	19.05	2	20.0	0	0	0	0	0	0	0	0	0	0	0	....	4	2	0	0	0	2	2	0	0	0	0
Manchester	*4,000	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	2	0
Phelps	*7,000	9	15.43	2	22.2	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	2	1	1	1	2
Geneva	*6,000	11	22.00	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	1	3	1	0	0	2	2	0	0	2	0
Penn Yan	*4,500	6	16.00	1	16.6	1	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	2	1	1	0	0	0
Lima	*2,800	2	8.57	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	81	....	11	13.6	0	0	2	0	0	1	0	0	1	2	1	86.42	8	15	0	6	2	10	9	3	7	10	4
LAKE ONTARIO & WESTERN DISTRICT:																												
OSWEGO	*24,000	31	15.50	11	35.5	0	0	1	0	0	1	2	0	2	0	0	193.55	5	3	0	1	2	3	3	1	3	2	2
Lyons	*6,000	21	43.00	4	17.4	0	0	2	0	0	0	0	0	0	0	0	95.24	5	3	0	0	0	1	5	1	1	3	0
Arcadia	5,702	7	14.74	1	14.3	0	0	0	0	0	0	0	0	0	0	1	142.86	0	1	0	0	0	0	3	0	0	1	1
Palmyra	*4,800	5	12.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	3	1	0	0	0	0	1	0	0	0	0
Wolcott	3,753	5	15.10	1	20.0	0	0	0	0	0	0	1	0	0	0	0	200.00	2	0	0	0	0	0	0	0	0	1	1
ROCHESTER	*101,000	180	21.38	58	32.2	0	0	8	1	0	1	0	2	0	22	0	188.89	24	22	3	8	11	6	34	5	3	8	22
Sweden	5,736	5	10.46	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	0	0	0	2	0
Greece	*5,000	3	7.20	0	......	0	0	0	0	0	1	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	2	0
Mendon	3,200	4	15.00	1	25.0	0	0	0	0	0	0	0	0	0	1	1	500.00	0	2	0	0	0	0	0	0	0	0	0
Brighton	3,736	8	25.69	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	3	0	1	1	0	0	0
Ogden	*3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	2	1	0	0	0	0
Albion	5,147	3	7.00	0	......	0	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	1	0	1	0	0	0	0
LOCKPORT	*16,000	18	13.50	0	......	0	0	0	0	0	0	0	0	1	0	0	55.56	4	6	0	0	0	2	0	1	0	4	0
Tonawanda	4,900	10	24.50	3	30.0	0	0	2	0	0	0	0	0	0	0	0	200.00	0	3	0	1	0	0	1	0	0	1	2
Hamburg	3,235	3	11 13	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	2	0	0	0
Rest of district	....	91	....	10	11.3	0	0	3	2	0	0	2	0	0	2	1	113.64	11	9	0	8	8	9	9	2	4	16	5
Totals for the State.	....	6,571	....	2,163	32.95	42	2	92	64	0	127	177	29	58	443	104	111.20	1,078	1,028	93	329	371	404	691	148	165	425	701

REMARKS.— The total reported mortality for the month is 6,571, the percentage of infant mortality being 32.95. From croup and diphtheria, the percentage of mortality is 6.8; from consumption, 15.8; from other respiratory diseases, 16.4; from typhoid fever, 1.4; from all zymotic diseases, 11.12. Attention is called to the addition in the table of a column showing the rate per thousand of deaths from zymotic diseases to deaths from all causes in each locality; in estimating the significance of this list, the populations must be considered, although these are now too inexact to base a ratio of these diseases upon. The reports of a number of localities, some of which have been already mentioned, are still too imperfect to be taken as an exhibit of their heathfulness compared with other communities which send full returns; but material improvement has been secured since the publication of this Bulletin was commenced.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during February, 1885.

	Population.	*Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhoeal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhoeal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	3,066	26.33	1,249	40.7	18	1	11	39	0	73	119	16	27	209	49	183.30	666	450	33	122	186	182	281	68	103	224	189
BROOKLYN	*665,602	1,167	21.01	453	38.8	0	0	3	12	0	30	17	11	17	79	20	161.96	286	165	28	46	65	58	109	16	22	18	165
Gravesend	*5,000	6	14.40	3	50.0	0	0	1	0	0	0	0	0	0	0	0	166.67	1	0	0	1	1	0	1	0	0	0	1
New Lots	*18,000	31	20.06	20	64.51	1	0	0	2	0	0	1	0	0	2	0	193.55	8	3	0	4	0	3	1	0	2	0	4
New Utrecht	4,742	11	28.00	2	18.2	0	0	0	0	0	0	0	0	0	0	0	....	3	2	0	0	0	2	3	0	0	1	0
Flatlands	3,127	3	11.51	1	33.3	0	0	0	1	0	0	0	0	0	0	1	333.33	0	0	0	0	0	0	1	0	0	0	0
LONG ISLAND CITY	*21,000	43	24.57	15	34.9	0	0	0	0	0	0	0	1	0	5	1	162.79	17	0	1	1	0	7	8	1	0	1	0
Newtown	*10,000	21	25.20	4	19.0	0	0	0	1	0	0	0	0	0	3	0	190.46	5	1	0	1	0	2	3	0	2	1	2
Oyster Bay	*12,000	16	16.00	0	......	0	0	2	0	0	0	0	0	0	0	0	125.00	3	5	1	0	1	0	0	0	0	1	3
Hempstead	18,160	21	13.87	11	52.4	0	0	0	1	0	3	2	0	0	2	0	380.05	4	3	0	1	1	0	1	0	0	1	2
North Hempstead	*7,000	11	18.86	3	33.3	0	0	0	0	0	0	1	0	0	0	0	90.90	3	1	0	1	0	1	1	1	1	1	0
Babylon	4,739	8	20.25	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	3	3	0	0	0	0	2	0	0	0	0
Southold	7,267	13	21.46	7	53.8	0	0	0	0	0	0	0	0	1	0	0	76.92	6	3	0	0	0	2	0	0	0	0	1
Southampton	6,352	7	13.21	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	1	2	0	0	1	1
Northfield	7,014	9	15.43	0	......	0	0	0	0	0	0	0	0	0	1	0	111.11	4	0	0	0	0	2	0	0	0	2	0
Westfield	5,289	7	15.88	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	1	1	1	1	0
YONKERS	*22,000	22	12.00	7	31.8	0	0	0	0	0	1	0	0	0	1	0	90.90	7	3	1	0	1	1	2	1	1	1	[illegible]
Westchester	*6,900	9	15.66	2	16.7	0	0	0	0	0	1	0	0	0	0	0	111.11	2	0	0	0	0	0	0	2	2	1	1
Rye	*7,500	5	7.67	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	1	1	0	0	1	0
Sing Sing	*6,500	13	24.00	2	15.3	0	0	0	0	0	0	0	0	0	0	1	76.92	1	3	0	1	0	1	2	0	0	2	2
Rest of district	....	29	....	3	.....	0	0	0	0	0	1	0	1	0	2	0	....	4	9	1	0	0	5	5	0	0	1	0
HUDSON VALLEY DIST.:																												
ALBANY	*99,435	155	18.71	39	25.2	0	0	1	0	0	2	1	0	0	7	0	70.97	22	31	2	16	2	16	22	5	5	8	15
COHOES	*20,000	18	10.80	7	38.9	0	0	0	0	0	0	0	0	0	0	0	....	3	5	0	0	0	0	2	1	2	1	4
West Troy	*13,000	24	22.22	8	33.3	0	0	0	0	0	0	0	0	0	0	0	....	9	1	1	1	0	2	5	0	0	4	1
Hoosic Falls	*4,000	5	15.00	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	2	0	0	1	1
TROY	*60,000	103	20.60	25	24.5	0	0	1	0	0	2	0	0	0	8	1	116.50	10	20	1	7	6	9	30	2	3	3	0
Lansingburgh	*8,500	19	26.82	5	26.2	0	0	0	0	0	0	0	0	0	6	0	315.62	3	2	0	0	3	3	1	0	0	1	0
Green Island	*5,000	2	4.80	2	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	0	1
Greenbush	*7,000	10	17.14	5	50.0	3	0	0	0	0	0	0	0	0	0	0	300.00	2	1	0	0	0	1	1	0	1	1	0

Rosendale	5,000	5	12.00	4	80.0	0	0	1	0	0	0	0	0	0	1	1	600.00	0	0	1	0	0	2	0	0	0	0	0
Marbletown	4,000	7	21.00	0	......	0	0	0	0	0	0	0	0	0	0	1	142.86	1	1	0	0	0	0	3	0	1	0	0
POUGHKEEPSIE	20,207	29	17.25	3	10.3	0	0	0	0	0	0	0	0	0	0	0	....	6	5	0	2	1	0	3	2	1	6	3
Fishkill	10,732	18	20.12	4	22.2	0	0	0	0	0	0	0	0	0	0	0	....	4	5	0	0	1	3	1	0	1	0	3
Wappinger's Falls	*5,000	9	21.60	1	11.1	0	0	0	0	0	0	0	0	0	0	0	....	1	3	0	0	0	0	4	0	0	1	0
NEWBURGH	*20,000	24	14.40	7	29.2	0	0	0	0	0	0	0	0	0	0	0	....	5	5	0	2	3	2	6	0	0	1	0
Middletown	*10,000	15	18.00	6	40.0	0	0	0	0	0	0	0	0	0	2	0	133.33	2	2	1	3	1	0	2	0	0	1	1
Port Jervis	*10,000	9	10.80	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	4	0	0	1	1	1	0	0	1	1
Goshen	4,387	12	32.82	2	16.7	0	0	0	1	0	0	0	0	0	2	0	250.00	2	0	0	3	0	0	1	0	0	2	1
Warwick	5,700	6	12.63	3	50.0	0	0	0	0	0	1	0	0	0	0	1	500.00	0	1	0	1	0	0	1	0	0	0	1
Ramapo	5,000	9	21.60	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	4	0	0	0	0	1	2	0	0	2	0
Haverstraw	7,000	10	17.14	4	40.0	0	0	1	0	0	0	0	0	0	1	0	200.00	1	1	0	1	0	0	3	0	0	0	2
Esopus	4,736	4	10.13	1	25.0	0	0	1	0	0	0	0	0	0	0	0	250.00	1	1	0	1	0	0	0	0	0	0	0
Rest of district	....	127	....	23	......	0	0	1	0	0	0	1	1	0	8	1	....	22	16	1	10	8	13	23	2	3	9	8
ADIRONDACK & NORTHERN DISTRICT:																												
Greenwich	3,861	5	15.54	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	2	2
Fort Ann	3,262	2	7.36	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	0	0	0	0
Fort Edward	4,680	8	20.51	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	0	1	2	0	0	0	0	0
Queensbury	*10,000	18	21.80	8	44.4	0	0	0	0	0	0	0	0	1	0	0	55.55	7	2	0	1	1	1	3	0	1	0	1
Crown Point	4,287	5	12.82	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	1	1	0	0	0	0	0	1	0	0	1
Malone	7,908	4	6.08	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	2	0	0	0	0	0	0	0	0	0
OGDENSBURGH	*10,400	17	19.61	8	47.1	1	0	0	0	0	0	0	0	0	3	1	294.12	4	4	0	1	0	0	1	0	0	0	2
Adams	3,302	5	18.18	1	20.0	0	0	0	0	0	0	0	0	0	1	0	200.00	1	1	0	0	0	0	1	0	0	1	0
Ellisburgh	4,812	7	17.50	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	4	1	0	0	0	2	0	0	0	0	0
WATERTOWN	*13,000	12	11.08	3	25.0	0	0	0	0	0	0	0	0	0	0	1	83.33	2	1	0	1	1	2	2	0	0	1	1
Cape Vincent	3,143	4	15.27	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	1	0	0	0	0	1	0
Rest of district	....	118	....	39	32.2	0	0	3	0	0	2	0	0	0	16	0	177.96	25	13	2	6	3	13	5	2	3	16	9
MOHAWK VALLEY DIST:																												
SCHENECTADY	*15,000	16	12.80	4	25.0	1	0	1	0	0	0	0	0	0	0	0	125.00	2	2	0	0	2	2	1	0	0	2	3
Middleburgh	3,376	4	14.20	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	3
Cobleskill	3,371	5	17.79	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	3	0	1	0	0
Schoharie	3,350	1	3.58	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
Amsterdam	*13,000	27	25.00	10	37.0	1	0	0	0	0	0	4	0	1	0	0	407.40	5	6	0	2	1	1	1	2	0	0	3
Johnstown	*6,000	4	8.00	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	0	0	0	0	1	0	0	1	0	1	0
Gloversville	*8,000	11	16.50	3	......	0	0	0	0	0	0	1	0	0	0	0	90.90	3	0	1	1	0	1	3	1	0	0	0
Little Falls	*7,300	7	11.51	1	14.3	0	0	0	0	0	0	0	0	0	1	0	142.86	1	1	0	0	0	1	2	1	0	0	0
Ilion	*4,500	4	10.67	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	1	0	0	0	0
UTICA	*40,000	59	17.70	18	30.5	0	0	0	1	0	0	0	1	0	8	1	186.44	10	9	1	4	1	0	12	2	0	4	5
ROME	12,045	19	19.00	4	21.0	2	0	0	0	0	0	1	0	0	0	0	157.90	2	4	0	0	1	0	1	1	0	4	3
Boonville	4,000	4	12.00	3	75.0	0	0	0	0	0	0	3	0	0	0	0	750.00	0	0	0	0	0	0	1	0	0	0	0
Camden	3,400	3	10.59	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	1	0	0	1
Waterford	4,326	10	27.97	4	40.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	2	0	3	1	0	0	1	1
Milton	5,565	9	19.41	1	11.1	0	0	0	0	0	0	0	0	0	1	0	111.11	4	1	0	0	1	0	1	0	0	0	1
Saratoga Springs	*10,000	24	28.80	5	20.8	0	0	0	0	0	0	0	1	0	1	0	....	6	3	0	2	1	1	2	1	0	4	2
Rest of district	....	72	....	12	16.9	1	0	2	0	0	0	0	0	0	1	0	56.34	12	2	1	2	3	7	14	1	2	16	8
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	34	20.04	9	26.5	0	0	1	1	0	0	1	0	0	1	0	117.65	8	2	1	1	0	5	3	1	3	1	5
Candor	4,323	5	13.88	0	......	0	0	0	0	0	0	1	0	0	0	0	200.00	1	0	0	0	0	0	1	0	0	1	1

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MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
ELMIRA	*25,000	37	17.76	11	29.7	0	0	0	0	0	4	0	0	0	0	0	108.11	3	4	0	1	0	4	6	4	3	3	5
Horseheads	*3,500	3	10.29	2	66.7	0	0	0	0	0	0	0	0	0	1	0	333.33	1	0	0	0	0	0	0	0	0	0	1
Hornellsville	*10,000	18	21.60	5	27 8	1	0	0	0	0	0	0	0	0	0	0	52.78	7	1	1	4	0	1	1	1	0	0	1
Bath	7,400	9	14.60	1	11.1	0	0	0	0	0	0	0	0	0	0	0	......	1	3	0	0	0	0	1	0	1	2	1
Olean	8,000	7	10.50	4	57.1	0	0	0	0	0	1	0	0	0	1	0	285.71	1	0	0	0	0	0	2	0	0	2	0
Jamestown	*12,000	12	12.00	5	41.7	0	0	0	0	0	0	0	1	0	0	0	83.33	2	0	0	2	0	3	1	0	0	1	2
Westfield	3,500	4	13.72	0	......	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	0	0	3	0	0	0	0
Rest of district	......	24	......	3	12.5	0	0	0	0	0	0	0	0	0	0	1	......	3	2	1	0	2	4	2	0	0	6	4
EAST CENTRAL DIST:																												
Walton	3,541	4	13.55	1	25.0	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	0	1	1	1	0	0
Delhi	3,000	4	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	1	1	0	0	1	0
Liberty	3,209	6	22.50	2	33.3	0	0	0	0	0	0	0	0	0	0	0	......	2	0	0	0	1	0	0	0	0	2	1
Cooperstown	*3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	2	0	0	0	0	0
Oneonta	*7,000	9	15.43	3	33.3	0	0	0	0	0	0	0	0	0	0	1	111.11	1	1	0	1	1	1	2	0	0	0	1
Worcester	*3,000	3	12 00	1	32.3	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	0	0	1
Brookfield	3,686	2	6.51	1	50.0	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	0	1	0	0	0	0
Norwich	5,755	3	6.25	0	......	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	1	1
SYRACUSE	*65,000	89	16.43	17	19.1	3	0	1	0	0	0	0	0	0	9	0	146.07	18	14	0	4	3	2	9	3	1	6	15
Geddes	7,000	2	3.43	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	1	0	0	0	0	0	0	0	0	0
Homer	3,600	4	13.71	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	1	1	0	0	0	0	0	0	1
Rest of district	......	66	......	10	15.2	1	0	1	0	0	0	0	2	0	3	0	106.06	14	7	2	5	0	3	7	2	3	8	8
WEST CENTRAL DIST:																												
AUBURN	*26,000	32	14.77	7	21.9	0	0	0	0	0	0	0	0	0	1	0	31.25	10	5	0	3	0	1	6	1	2	2	1
Groton	3,460	7	24.35	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	1	1	0	1	0	0	3	0
Ithaca	11,198	14	15 00	4	28.6	1	0	0	2	0	0	0	0	0	0	0	211.29	8	0	0	0	0	2	0	0	0	0	1
Fayette	3,316	3	10.91	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	0	2	0	0	1	0
Waterloo	*5,000	8	19.20	3	37.5	0	0	0	0	0	0	0	0	0	0	1	125.00	0	0	1	0	0	1	2	0	1	0	2
Seneca Falls	6,853	17	29.76	5	29.4	0	0	0	0	0	0	0	0	0	1	0	58.82	2	3	0	1	0	2	2	0	0	3	8
Hector	5,025	4	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	......	3	0	0	0	0	1	0	0	0	0	0
Manchester	*4,000	6	18.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	......	2	0	1	0	0	0	1	0	0	1	1
Canandaigua	6,300	6	11.43	1	16.7	0	0	0	0	0	0	0	0	0	0	1	333.33	1	1	1	0	0	0	0	0	1	0	0
Geneva	*6,000	14	28.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	4	2	1	0	3	2	0	1	0	1	0

Lima	2,800	8	34.28	1	12.5	0	0	0	0	0	0	0	0	0	2	0	250.00	3	2	0	0	0	0	0	0	0	1	0
Rest of district	....	94	....	9	9.5	0	0	1	1	0	0	0	1	0	0	0	22.73	19	14	2	5	7	10	9	2	5	10	9
LAKE ONTARIO & WESTERN DISTRICT:																												
OSWEGO	*24,000	30	15.00	13	43.3	0	0	0	0	0	0	1	0	2	1	1	166.66	5	3	0	1	1	4	4	0	0	5	2
Fulton	*5,000	6	14.40	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	1	2	1	0	0	0	0
Lyons	*6,000	10	20.00	2	20.0	0	0	1	0	0	0	0	0	0	0	0	100.00	2	1	0	1	1	0	1	0	0	1	2
Arcadia	5,702	4	8.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	4	0
Palmyra	*4,800	3	7.50	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	1	1
Wolcott	3,753	5	15.99	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	0	0	0	1	1
Sodus	5,285	7	15.90	3	42.9	0	0	0	0	0	0	0	0	1	0	0	142.86	1	2	0	0	0	1	2	0	0	0	0
ROCHESTER	*101,000	134	15.92	40	29.8	0	0	3	1	0	0	0	3	0	13	2	164.18	19	10	2	6	7	7	22	4	7	6	22
Sweden	5,735	9	18.83	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	2	2	1	0	2	1
Greece	*5,000	7	16.80	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	2	0	2	0	0	0	0
Penfield	*3,000	4	16.00	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	2	1	0	1	0	0	0	0
Ogden	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	0	0	0	0	0
LOCKPORT	*16,000	11	8.25	1	9.1	0	0	1	0	0	0	0	0	0	0	0	90.91	0	1	0	0	0	4	0	1	0	4	0
Tonawanda	4,900	3	9.23	2	66.6	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	0	1
Amherst	4,518	9	23.89	3	33.3	0	0	0	0	0	4	0	0	0	1	0	555.55	0	0	1	1	0	0	0	0	1	1	0
Rest of district	....	119	....	19	14.5	3	0	4	3	0	1	0	2	1	2	0	136.75	16	18	1	7	4	9	12	8	2	20	6
Totals for the State.	....	6,606	....	2,288	34.27	40	1	52	70	0	126	154	41	53	412	89	125.37	1,396	929	95	302	338	437	712	149	190	456	564

REMARKS. — The total reported mortality for the month is 6,606, the percentage of infant mortality for the State being 34.27. The total number of deaths reported from zymotic diseases is 837, the ratio per thousand deaths from all causes being 125.37, or about one-eighth. The percentage of mortality from croup and diphtheria is 4.67, and from typhoid fever 0.78, the number of deaths from both being considerably less than in January. The continued prevalence of measles is reported from various localities, but the number of deaths for the State is less than for the preceding month, being 2.32 per cent. The principal mortality is from acute respiratory diseases, the percentage being 20.91; from consumption it is 13.91.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during March, 1885.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	3,344	28.72	1,327	39.7	27	0	10	37	0	77	119	21	35	190	58	169.56	797	530	51	127	206	184	304	67	93	242	169
BROOKLYN	*665,602	1,312	23.82	520	39.4	0	0	9	15	0	35	24	17	20	68	25	161.24	314	175	32	65	54	73	123	29	47	22	165
Gravesend	*5,000	7	16.60	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	2	1	2	1	1	0	0
New Lots	*17,000	38	25.83	20	52.6	1	0	0	0	0	0	0	0	0	4	0	131.57	5	8	1	5	1	1	3	2	2	0	5
New Utrecht	4,742	17	43.02	7	41.2	0	0	0	0	0	0	1	0	0	0	0	58.82	7	1	1	0	1	0	1	0	1	2	2
Flatlands	3,127	6	23.02	1	16.7	0	0	0	0	0	2	0	0	0	0	0	333.34	1	1	0	0	1	0	0	0	0	0	1
LONG ISLAND CITY	*21,000	42	24.00	12	28.6	0	0	0	0	0	1	1	0	1	0	0	71.43	22	1	0	0	1	3	5	1	1	1	4
Newtown	*10,000	25	30.00	8	32.0	0	0	0	0	0	2	0	0	0	2	1	200.00	5	7	0	0	0	2	2	0	0	0	4
Oyster Bay	*12,000	16	16.00	3	18.7	0	0	0	0	0	0	1	0	0	3	1	125.00	3	0	0	0	1	0	5	0	1	0	1
Hempstead	18,100	18	12.00	6	33.3	0	0	1	0	0	1	1	0	0	2	0	277.78	4	2	0	0	1	2	1	1	0	1	1
North Hempstead	*7,000	15	25.71	3	20.0	0	0	0	0	0	1	1	0	0	1	0	300.00	1	2	0	0	0	4	1	2	1	0	1
Jamaica	10,089	15	17.82	8	53.3	0	0	0	0	0	0	0	0	0	0	0	....	4	1	0	1	2	0	2	0	0	1	4
Babylon	4,739	14	35.44	4	28.6	0	0	0	0	0	1	0	0	0	0	0	71.43	5	2	0	2	0	0	3	0	0	0	1
Southold	7,267	10	16.51	4	40.0	0	0	0	0	0	0	0	0	0	0	1	100.00	3	2	1	0	0	0	2	0	0	0	1
Southampton	6,352	10	18.89	2	20.0	0	0	1	0	0	0	0	0	0	0	0	100.00	2	1	0	2	0	1	1	0	0	1	1
Northfield	7,014	15	25.71	4	26.7	0	0	0	0	0	2	0	0	0	1	0	200.00	2	2	0	0	2	0	3	0	0	2	1
Westfield	5,289	6	13.61	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	2	0	1	2	0	1	0	0
YONKERS	*22,000	5	19.09	14	40.0	0	0	0	1	0	0	0	1	0	1	0	85.72	12	6	0	3	1	2	3	1	0	0	3
Westchester	*6,900	7	12.18	1	14.3	0	0	0	0	0	0	0	0	0	1	0	142.86	4	2	0	0	0	0	0	0	0	0	0
Rye	*7,500	7	11.20	0	......	0	0	0	1	0	0	0	0	0	0	0	142.86	3	0	0	1	1	0	1	0	0	0	0
Sing Sing	*6,500	14	25.84	5	35.7	0	0	0	0	0	0	0	0	0	0	0	....	1	3	0	0	1	2	2	2	0	0	3
Rest of district	....	50	....	9	18.0	0	0	0	2	0	0	2	1	0	2	2	180.00	9	6	0	1	2	5	10	0	0	6	2
HUDSON VALLEY DIST.:																												
ALBANY	*99,435	154	18.58	55	35.7	2	0	6	0	0	0	6	0	0	5	4	149.35	27	19	1	8	10	3	36	3	3	4	17
COHOES	*20,000	40	24.00	19	47.5	0	0	2	1	0	0	0	0	1	2	2	200.00	5	5	0	1	2	4	5	1	2	0	7
West Troy	*13,600	26	24.00	8	30.8	0	0	1	0	0	0	0	1	0	0	0	76.92	8	3	0	4	0	4	3	0	0	0	2
TROY	*60,000	129	25.80	45	34.7	0	0	0	0	0	2	0	3	0	5	0	77.50	29	31	0	7	5	10	29	3	0	4	1
Lansingburgh	*8,500	23	32.47	9	39.1	0	0	2	0	0	0	0	0	0	3	0	217.39	2	6	0	2	1	0	5	0	0	2	0
Green Island	*5,000	8	19.20	3	37.5	0	0	0	0	0	0	0	1	0	1	0	125.00	2	1	0	0	0	0	0	0	0	1	2
Greenbush	*7,200	17	28.05	6	35.3	2	0	0	1	0	0	0	0	0	1	0	235.30	1	4	0	1	0	1	3	0	2	1	0

Catskill	*4,500	13	34.67	4	30.8	0	0	0	0	0	0	0	0	0	0	1	76.92	0	1	0	1	0	3	6	0	0	0	1
HUDSON	*10,000	27	32.40	8	29.6	0	0	0	0	0	0	0	1	0	0	1	74.07	6	1	1	1	2	2	3	1	1	2	5
KINGSTON	20,000	29	17.40	5	17.2	0	0	2	1	0	0	0	0	0	1	0	137.93	4	4	1	1	1	7	5	0	0	2	0
Wawarsing	8,847	6	8.41	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	3	0	1	0	1	0	0	0	0	1
Rosendale	5,000	8	19.20	5	62.5	0	0	0	0	0	0	0	0	1	1	1	250.00	1	2	0	0	0	0	3	0	0	0	0
Marbletown	4,000	3	9.00	2	66.7	0	0	0	0	0	0	0	0	0	0	1	....	2	0	0	0	0	0	1	0	0	0	0
Esopus	4,736	6	15.20	4	66.7	0	0	0	0	0	0	0	0	0	0	0	....	4	0	0	0	0	2	0	0	0	0	0
Saugerties	*4,000	8	24.00	3	37.5	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	0	1	1	0	3
POUGHKEEPSIE	20,207	46	27.32	11	23.9	0	0	2	0	0	0	1	0	0	1	2	130.43	5	6	0	3	3	2	4	0	1	5	11
Fishkill	10,732	9	10.06	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	1	0	0	0	0	0	1	3
Wappinger's Falls	*5,000	3	7.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	1	0	0	0	0	0	0	1	0
NEWBURGH	*20,000	23	13.80	6	26.1	0	0	0	0	0	0	0	0	0	2	0	82.61	3	5	0	1	0	1	6	0	2	1	2
Port Jervis	*10,000	11	13.20	3	27.3	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	1	1	3	0	1	0	2
Goshen	4,387	8	21.88	3	37.5	0	0	0	0	0	0	0	0	1	0	0	125.00	2	1	0	0	0	2	1	0	0	1	0
Orangetown	8,077	a27	40.00	7	25.9	0	0	0	0	0	0	2	0	0	0	1	111.11	5	1	0	3	2	3	0	3	2	2	3
Ramapo	5,000	6	14.40	0	......	0	0	0	0	0	0	0	0	0	0	1	166.67	3	1	0	0	0	0	0	1	0	1	3
Haverstraw	7,000	11	18.86	4	36.4	0	0	0	0	0	0	0	0	0	1	0	90.90	4	0	0	0	0	2	2	0	0	0	0
Rest of district	....	164	....	32	19.5	0	0	6	0	0	4	5	0	0	6	0	121.95	44	24	1	5	3	13	18	6	1	16	13
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	3	9.73	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	2	0	0	0	0	0
Greenwich	3,861	3	9.33	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	0	0	0	0	1
Fort Ann	3,262	6	22.07	4	66.7	0	0	0	0	0	0	0	0	1	0	0	166.67	2	0	0	0	0	0	1	0	1	1	0
Fort Edward	4,680	7	17.97	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	3	0	0	1	1
Queensbury	*10,000	14	16.80	4	28.6	0	0	0	0	0	0	0	0	0	0	0	....	3	3	0	0	0	4	2	0	0	1	1
Crown Point	4,287	6	16.79	3	50.0	0	0	0	0	0	0	0	0	0	2	0	333.33	3	0	0	1	0	0	0	0	0	0	0
Malone	7,908	11	16.71	3	27.3	1	0	0	1	0	1	0	0	0	1	0	362.72	0	0	0	0	1	1	3	0	0	2	0
OGDENSBURG	*10,400	17	19.61	9	53.0	0	0	0	0	0	0	1	0	0	2	2	294.12	5	2	0	2	0	1	0	0	0	1	1
Gouverneur	*5,000	b13	31.20	4	30.8	0	0	0	0	0	1	0	0	0	1	0	153.85	4	1	0	0	0	1	1	1	0	2	1
Ellisburgh	4,812	10	24.93	4	40.0	0	0	0	0	0	0	0	0	0	0	0	....	4	1	0	0	1	0	1	0	0	2	1
WATERTOWN	*13,000	7	6.00	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	2	0	1	1	0	0	0	0
Cape Vincent	3,143	4	15.27	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	3	0	0	1	0	0	0	0	0	0	0
Rest of district	....	131	....	35	25.4	0	0	1	0	0	1	0	1	0	9	0	89.55	35	26	1	7	3	8	13	6	4	10	14
MOHAWK VALLEY DIST.:																												
SCHENECTADY	*15,000	28	22.40	9	32.2	2	0	1	0	0	0	0	0	0	0	1	142.86	4	4	0	1	0	3	8	0	1	2	1
Middleburgh	3,376	1	3.55	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
Cobleskill	3,371	3	10.68	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	0	9	0	1	0
Amsterdam	*13,000	14	12.92	6	42.9	0	0	1	0	0	0	2	0	0	0	0	214.29	3	1	1	0	1	1	2	0	0	1	1
Johnstown	*6,000	6	12.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	1	0	0	1	1
Gloversville	*8,000	5	7.50	1	20.0	0	0	0	0	0	0	1	0	0	0	0	200.00	0	0	0	0	1	0	2	0	0	0	1
Little Falls	*7,300	7	11.51	2	28.6	0	0	1	0	0	0	0	0	0	0	0	142.86	0	0	1	1	0	0	1	0	1	1	1
Ilion	*4,500	5	13.34	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	3	0
UTICA	*39,000	72	22.15	18	25.0	0	0	0	0	0	0	1	1	0	4	0	83.33	18	10	0	1	3	7	13	1	0	7	11
ROME	12,045	15	14.94	2	13.3	0	0	0	0	0	0	2	0	0	1	0	200.00	3	1	1	0	0	1	2	1	1	0	2
Boonville	4,000	9	27.00	4	44.4	0	0	0	0	0	0	0	0	0	2	0	222.22	1	3	0	1	1	0	1	0	0	0	0
Camden	3,400	4	14.12	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	2	0	0	0	0
Waterford	4,326	17	47.11	5	29.4	0	0	0	0	0	0	0	0	0	1	1	117.65	5	4	1	1	0	0	1	0	0	0	3
Milton	5,565	14	30.19	1	7.1	0	0	0	1	0	0	0	0	0	0	0	71.43	2	1	0	1	1	2	0	0	0	0	6
Saratoga Springs	*10,000	21	25.20	6	28.6	0	0	0	1	0	0	0	0	0	0	0	47.62	2	6	0	0	1	0	7	0	2	0	2
Rest of district	....	89	....	14	15.7	1	0	0	1	0	0	2	2	0	0	0	67.40	20	12	3	5	1	11	7	1	2	10	11
SOUTHERN TIER DIST.:																												
BINGHAMTON	*20,000	23	13.80	6	26.1	0	0	1	1	0	0	0	1	0	1	1	....	6	3	0	2	0	2	2	0	0	0	3
Owego	6,000	5	10.00	3	60.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	1	0	0	0	1
Candor	4,323	4	11.10	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	1	0	1	0	0	0	0	1

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
ELMIRA	*25,000	24	11.52	4	16.7	0	0	1	0	0	0	0	0	0	1	0	83.33	3	6	2	3	1	1	5	0	1	0	0
Horseheads	3,500	3	10.29	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	1	1	0	0
Hornellsville	*10,000	10	12.00	4	40.0	0	0	0	0	0	0	0	0	2	0	0	200.00	2	1	0	1	0	2	0	0	0	1	1
Bath	7,400	11	17.84	2	18.2	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	2	3	0	1	2	1
Olean	8,000	2	3.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	1	0
Jamestown	*12,000	16	16.00	2	12.5	0	0	0	0	0	0	0	0	0	0	0	....	6	4	0	0	0	2	2	0	0	1	1
Westfield	3,500	3	10.28	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	1	0	0	0	1	0
Rest of district	....	37	....	6	16.2	0	0	0	0	0	1	0	2	0	1	0	108.11	11	5	0	0	1	0	9	0	0	4	3
EAST CENTRAL DIST.:																												
Walton	3,541	5	16.94	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	1	0	0	0	1	0
Delhi	3,000	9	36.00	1	11.1	0	0	0	0	0	0	0	0	0	2	0	333.33	2	0	0	0	0	0	0	1	0	2	2
Cooperstown	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	1	0	333.33	0	0	0	0	0	2	0	0	0	0	0
Oneonta	*7,000	15	25.71	3	20.0	0	0	0	0	0	0	0	1	0	0	0	66 67	6	1	0	1	2	2	1	0	0	0	1
Worcester	*3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Brookfield	3,685	11	35.82	3	27.3	0	0	0	0	0	0	0	0	0	1	1	181.82	5	0	0	0	0	1	2	0	0	1	0
Baldwinsville	*3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	1	0	0	0	1
SYRACUSE	*65,000	81	14.95	15	18.5	0	0	0	1	0	0	0	1	0	4	0	74.07	18	11	1	4	1	7	14	3	4	8	4
Geddes	7,000	2	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	0	0
Homer	3,500	10	34.28	3	36.0	0	0	0	0	0	0	0	0	0	1	0	100.00	2	1	0	1	0	0	1	0	0	0	4
Rest of district	....	110	....	15	13.7	2	0	2	0	0	0	2	0	0	3	0	81.81	27	11	2	2	8	10	18	6	0	9	8
WEST CENTRAL DIST.:																												
AUBURN	*26,000	31	11.92	4	13.3	0	0	0	0	0	0	0	0	0	0	2	64.52	8	9	0	2	2	0	2	1	1	2	2
Groton	3,450	2	6.95	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	0	0	0	0	0
Ithaca	11,198	11	11.79	0	......	0	0	1	0	0	0	0	0	0	0	0	90.91	3	2	0	1	0	2	0	0	0	2	0
Waterloo	*4,500	7	18.67	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	2	1	0	0	0	2
Seneca Falls	6,853	5	8.76	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	1	0	0	2
Hector	5,025	4	9.60	1	25.0	0	0	0	0	0	1	0	0	0	0	0	250.00	1	0	0	0	0	1	1	0	0	0	0
Manchester	*4,000	7	....	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	2	2	0	0	2	0
Phelps	*7,000	4	6.86	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	1	1	0	0	0	0
Geneva	*6,000	13	26.00	1	7.7	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	2	0	1	2	1	1	3	1
Dansville	*3,700	9	29.19	2	22.2	0	0	0	1	0	0	0	0	0	0	0	111.11	1	3	0	0	0	0	2	0	0	1	1
Lima	*2,800	1	4.29	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	109	....	16	14.7	0	0	3	0	0	0	0	2	0	1	1	64.22	17	12	2	4	7	10	12	3	1	20	10

LAKE ONTARIO & WESTERN DISTRICT:																											
OSWEGO	*24,000	38	19.00	14	36.8	0	0	2	0	0	0	1	0	2	0	0	131.58	4	4	2	1	5	5	4	0	1	4	3
Fulton	*5,000	7	16.60	1	14.3	0	0	0	0	0	0	0	1	0	0	0	166.67	0	1	0	0	1	2	0	0	0	1	1
Lyons	*6,000	5	10.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	0	0	0	0	0	2
Arcadia	5,702	10	21.00	0	......	0	0	0	0	0	0	0	1	0	0	0	100.00	3	2	2	0	0	0	0	0	0	0	2
Palmyra	*4,800	8	20.00	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	3	0	0	0	1	0	1	1	0	1	1
Wolcott	3,753	6	19.18	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	1	1	0	1	0	0	0	0	0	2	0
ROCHESTER	*101,000	161	19.13	52	32.4	0	0	1	2	0	1	1	0	0	7	2	86.95	27	18	4	10	12	14	25	6	4	5	22
Brockport	*4,500	9	24.00	3	33.3	0	0	0	0	0	0	1	2	0	1	0	444.44	1	1	0	1	0	0	0	0	0	2	0
Greece	*5,000	5	12.00	1	20.0	0	0	0	2	0	0	0	0	0	0	0	400.00	1	1	0	0	0	0	0	0	0	0	1
Mendon	3,200	4	15.00	1	25.0	0	0	1	0	0	0	0	0	0	0	0	250.00	2	0	1	0	0	0	0	0	0	0	0
Brighton	3,736	5	16.06	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	2	0	0	0	0	0	0	0
Ogden	*3,000	8	32.00	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	2	2	0	0	1	0
Albion	*5,000	7	16.80	2	28.6	0	0	0	0	0	0	0	0	1	0	0	142.86	1	1	0	0	0	0	1	0	1	1	0
LOCKPORT	*16,000	13	9.75	1	7.7	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	0	0	2	0	0	5	0	0
Tonawanda	4,900	6	14.70	3	50.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	2	0	0	0	0	0	1	1
Amherst	4,518	5	13.28	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	2	2
Rest of district	....	124	....	31	25.2	2	0	2	1	0	1	2	2	2	2	1	121.95	19	12	2	7	4	13	13	6	3	16	14
Totals for the State.	....	7,391	....	2,561	34.6	40	0	60	71	0	135	180	63	67	352	113	146.08	1,684	1,083	118	329	368	481	812	165	200	467	603

REMARKS.—The total reported mortality for the month is 7,400, being an excess of 724 deaths over the number reported in the February bulletin. The percentage of infant mortality is 34.27, about the same as that of last month. The total number of deaths from zymotic diseases is 1,061, making a percentage of the total mortality of 14.60. The percentage of mortality from acute respiratory diseases is 22.76; from consumption it is 14.61. Since the February bulletin was issued, 167 delayed returns of deaths for that month have been received, of which the mortality under five years is 57.

a Number of deaths in April, 16; *b* Number of deaths in February, 14; from zymotic diseases, 6.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during April, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	3,067	26.46	1,197	38.7	10	0	14	33	0	77	98	12	26	181	66	166.93	675	475	38	130	240	226	269	0	115	229	183
BROOKLYN	*665,602	1,272	22.93	485	34.2	0	0	7	15	0	40	35	11	15	57	15	157.23	315	190	23	56	58	60	136	26	30	31	152
Gravesend	*5,000	8	19.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	0	0	2	0	2	0	0
New Lots	*17,000	31	20.66	11	35.4	0	0	0	0	0	0	0	0	0	1	1	32 25	6	4	1	0	3	2	7	1	1	1	3
New Utrecht	4,742	7	17.71	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	2	0	2	0	1	1	0
Flatlands	3,127	6	23.02	3	50.0	0	0	1	0	0	1	1	0	0	0	0	500.00	0	0	0	0	0	1	1	0	0	1	0
LONG ISLAND CITY	*21,000	28	16.00	17	60.7	2	0	0	2	0	2	2	0	2	1	0	392.87	11	0	0	2	0	0	3	0	0	1	0
Newtown	*10,000	24	28.80	6	25.0	0	0	0	0	0	1	0	0	0	1	0	83.33	4	4	0	1	1	1	3	0	0	3	5
Oyster Bay	*12,000	20	20.00	8	40.0	1	0	0	0	0	0	0	0	0	2	0	150.00	5	1	0	4	1	0	2	0	0	1	3
Hempstead	18,160	18	12.00	5	27.8	0	0	0	0	0	2	0	1	0	0	0	166.67	4	3	1	1	0	0	0	0	1	3	2
North Hempstead	*7,000	15	25.71	2	13.3	0	0	0	0	0	0	0	0	0	0	0	....	7	1	2	2	0	1	0	0	0	2	0
Jamaica	10,089	18	21.40	9	50.0	1	0	0	0	0	1	1	0	0	2	0	277.78	5	1	0	1	1	1	1	0	0	0	3
Babylon	4,739	a14	35.44	2	14.3	0	0	0	0	0	0	0	0	0	0	1	71.43	4	3	0	3	0	0	2	0	0	0	1
Southold	7,267	7	11.56	2	28.6	0	0	0	0	0	0	2	0	0	0	0	285.71	0	1	0	1	0	0	1	0	0	1	1
Southampton	6,352	12	22.67	5	41.7	0	0	0	0	0	1	1	0	1	0	0	250.00	2	1	0	0	0	1	0	0	0	4	1
Northfield	7,014	10	17.10	2	20.0	0	0	0	0	0	0	0	0	0	2	0	200.00	2	0	0	0	0	2	2	1	1	0	0
Westfield	5,289	12	27.22	1	8.3	0	0	0	1	0	2	0	0	0	0	0	250.00	3	1	1	0	0	2	1	1	0	0	0
YONKERS	*22,000	36	19.64	7	19.4	0	0	0	1	0	0	0	0	0	0	1	55.56	9	6	0	1	6	1	6	1	1	1	2
Westchester	*6,900	7	12.17	4	57.1	0	0	1	0	0	0	0	0	0	3	0	571.43	0	0	0	0	0	0	0	0	0	1	3
Rye	*7,500	6	9.60	2	33.3	0	0	0	0	0	1	0	0	0	0	0	166.67	1	2	0	1	0	0	1	0	0	0	0
Sing Sing	*6,500	12	22.15	2	16.7	0	0	0	0	0	1	0	0	0	0	0	83.33	1	1	0	0	0	4	2	0	2	1	0
Rest of district	....	52	....	11	21.1	2	0	0	1	0	0	6	0	0	2	1	230.77	10	10	0	3	2	1	5	0	2	3	4
HUDSON VALLEY DIST:																												
ALBANY	*95,000	163	20.59	44	27.0	0	0	4	1	0	0	9	0	0	5	1	123.70	28	25	0	7	5	14	22	7	5	7	23
COHOES	*20,000	38	22.80	22	57.9	1	0	0	0	0	0	0	0	0	3	0	105.26	8	9	1	0	1	1	5	0	2	0	7
West Troy	*13,000	17	15.69	2	11.8	0	0	1	0	0	0	0	0	0	0	0	58.82	5	2	0	1	1	2	4	0	0	1	0
Hoosac Falls	*4,000	11	33.00	4	36.4	0	0	1	0	0	0	0	0	0	0	0	90.91	3	2	0	1	1	0	1	0	0	1	1
TROY	*60,000	145	29.00	30	20.6	0	0	5	0	0	0	1	0	0	1	0	47 58	45	16	0	5	6	17	34	5	2	8	0
Lansingburgh	*8,500	14	19.76	3	21.4	0	0	0	0	0	0	1	0	0	0	0	71.43	1	3	0	4	1	4	0	0	0	0	0
Green Island	*5,000	8	19.20	3	37.5	1	0	1	0	0	0	0	0	0	0	0	230.00	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Greenbush	*7,200	12	20.00	4	33.3	0	0	1	0	0	0	0	0	0		0	83.33	2			1	0	2		0	1		1
Catskill	*4,500	4	10.67	2	50.0	0	0	0	0	0	0	0	1	0	0	0	260.00	1			0	0	1		0	0		0
HUDSON	*10,000	26	31.20	3	11.5	0	0	0	0	0	0	0	1	0	0	0	38.46	5			0	2	1		2	1		1
KINGSTON	20,000	21	12.60	6	28.6	1	0	0		0	0	0	0				238.10	2		2	2	1	3		0	1		0
Wawarsing	8,547	8	11.23	2	25.0	0	0	0	0	0	1	0	0	0			250.00	3		0	0	0	2			0	0	0
Rosendale	5,000	4	9.60	2	50.0	0	0	0	0	0	0	0	0	0			....	1		0	0	0	1			0	1	0
Marbletown	4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0		0	....	0	0	0	1	0	1	0		0	0	0
Esopus	4,736	9	22.80	2	22.2	0	0	0	0	0	0					0	111.11	4	0	0	0	0	0	0		0	1	3
Saugerties	*4,000	1	3.00	0	......	0	0	0	0	0	0					0	....	0	0	0	0	0		0		0	0	1
POUGHKEEPSIE	20,207	42	24.95	8	19.0	0	0	3	1	0	0		0	0		2	166.67	2	7	0	5	1	2	7	2	2	4	3
Fishkill	10,732	9	10.06	3	33.3	0	0	1	0	0	0		0	0		0	111.11	4	2	0	0	0	0	1	0	0	0	1
Wappinger's Falls	*5,000	7	16.80	0	......	0	0	0	0	0	0	0	0	0		0	....	1		0	0	1	0	1	0	0	0	0
NEWBURGH	*20,000	31	18.60	6	19.4	0	0	0	1	0	0	0	0	0			64.51	6		2	1	0	1	5	3	1	2	2
Port Jervis	*8,800	18	24.54	7	38.9	0	0	1	0	0	0		0				111.11	2	5	0	0	0		2	0	3	0	4
Middletown	*10,000	14	16.80	4	28.6	0	0	0	0	0	0		0				....	3	5	0		1		2	0	0	0	0
Goshen	4,387	8	21.88	1	12.5	0	0	0	0	0	0	0					125.00	2	1	0	0	1		1	0	0	2	0
Haverstraw	7,000	12	20.57	5	41.7	0	0	0	0	0	0	0					....	4	1	0	1	0		2	0	0	1	2
Ramapo	5,000	7	16.80	1	14.3	0	0	0	0	0							142.86	2	1	0	0	0	0	0		0	1	2
Rest of district	....	189	....	30	15.8	0	0	5	5	0							148.15	33	22		12		12	26		4	32	10
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	4	12.98	0		0	0	0		0					0		....	1	0	0	1	0	2	0	0	0	0	0
Greenwich	3,861	3	9.32	0	......	0	0	0	0	0		0			0		....	2	0	0	0	0	0	0	0	0	1	0
Fort Ann	3,262	5	18.39	1	20.0		0	0	0	0		0	0		0		200.00	0	0	0	0	0		0		0	3	0
Fort Edward	4,680	13	33.33	3	23.0	0		2		0			0		0		230.77	1	3	0	0	0		3		0	1	1
Queensbury	*10,000	9	10.80	3	33.3	0	0	6		0			0			0	111.11	3	0	0	1	0			0	0	2	1
Crown Point	4,287	2	5.59	1	50.0	0		0					0			0	....	1	0	0	0	0			0	0	0	0
Moriah	7,379	15	24.40	4	26.6	0	0	0	0				0			0	66.66	4	3	0	0					3	0	1
Malone	7,908	15	22.78	5	33.3	0		0	0			0	0			0	333.33	2	0		1					0	2	4
OGDENSBURGH	*10,400	16	18.46	4	25.0	0	0					0				0	62.50	1			1	0				0		2
Gouverneur	*5,000	13	31.20	6	46.1	0				0						0	307.69	2		1	0	1				0		1
Ellisburgh	4,812	5	12.64	0	......	0	0	0		0			0	0	0		....	0		0	1	0			0		0	0
WATERTOWN	*13,000	9	8.31	2	22.2	0	0			0			0	0	0		....	1		0	0	1			0		2	0
Cape Vincent	3,143	3	11.45	1	33.3	0						0	0	0			....	2	0	0	0	0	1	0	0		0	0
Rest of district	....	122	....	29	24.6	0						0	0	1			92.80	16	20	2		2	13	11	3		16	15
MOHAWK VALLEY DIST:																												
SCHENECTADY	*15,000	32	23.60	6	18.7	1	0	2	0	0	0			0		0	93.75	3		0		3			0			2
Cobleskill	3,371	1	3.56	0		0	0	0	0	0	0			0		0	....	0		0	0	0			0			0
Middleburgh	3,376	10	35.55	0	......	0	0	0	0	0					0	0	100.00	2	0	0	0	0			0			2
AMSTERDAM	*13,000	14	12.92	6	42.8	0	0	0	0	0					1	1	142.86	2	1	1	2	0			0			0
Johnstown	*6,000	6	12.00	1	16.7	0	0	0	0	0	0		0		0	0	....	0	2	0	1	0	0	2	0	0		0
Gloversville	*8,000	10	15.00	6	60.0	1	0	0	0	0	0		3		0	0	400.00	0	0	0	0	1	1	1	0	0		3
Little Falls	*7,300	10	16.44	0		0	0	0	1	0	0	0	0	0	0	0	100.00	0	2	0	1	0	0		0	1	3	1
Ilion	*4,500	7	18.67	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	1	1		0	1	0	6
UTICA	*39,000	51	15.64	15	29.4	1	0	1	0	0	0	0	0	0	3	0	98.04	10	9	0	2	2	3	13	2			3
ROME	12,045	24	24.00	7	29.1	0	0	0	0	0	0	3	1	0	0	0	166 67	1	4	0	3	0	1	5	0			2
Boonville	4,000	5	15.00	1	20.0	0	0	0	0	0	0	0		0			200.00	0	0	0	2	1	1	0	0	0		0
Camden	3,400	4	14.12	0		0	0	0	0	0	0	0		0			....	0	0	0	0	0	0	1	1	0		1
Waterford	4,328	9	24.95	5	55.5	0	0	1	0	0	0	0	0	0	1	0	222.22	1	0	0	0	0	0	4	0	1		0
Milton	5,565	8	17.25	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	0	0	1		4
Saratoga Springs	*10,000	18	21.60	3	16.7	0	0	0	0	0	0	0	0	0	5	0	277.78	2	3	0	0	3	1	8	0	0	1	0
Rest of district	....	76	....	20	26.3	1	0	0	0	0	0	3	0	0	2	0	78.95	13	11	0		2	6	8	2	3	10	11

a Three in public institutions.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	36	21.60	7	19.4	1	0	1	2	0	1	0	0	0	2	2	250.00	7	2	2	3	3	2	3	0	2	1	2
Candor	4,323	6	16.65	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	2	1	1	0	0	0	1	0
ELMIRA	*25,000	27	12.96	8	29.6	0	0	0	0	0	0	0	0	0	1	0	37.04	4	4	0	2	0	1	8	1	2	3	1
Hornellsville	*10,000	5	6.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	1	0	0	0	1
Bath	7,400	8	13.00	0	......	0	0	1	0	0	0	0	0	0	1	0	250.00	1	2	1	0	0	0	0	0	0	1	1
Olean	8,000	8	12.00	4	50.0	0	0	0	0	0	0	4	0	0	0	0	500.00	1	0	0	1	0	0	0	0	0	1	1
Jamestown	*12,000	10	10.00	3	30.0	0	0	0	0	0	0	0	1	0	0	1	200.00	2	1	0	1	0	1	1	0	1	1	0
Westfield	3,500	4	13.71	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	0	0	0	0	1	0	1	0	0	0
Rest of district	....	25	....	2	8.0	1	0	1	0	0	0	0	1	0	0	0	125.00	4	7	0	1	1	0	3	0	4	2	0
EAST CENTRAL DIST:																												
Franklin	*3,000	4	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	1	0	2	0
Delhi	3,000	3	12.00	0	......	0	0	0	0	0	0	1	0	0	0	0	333.33	1	0	0	0	0	0	0	0	0	1	0
Walton	3,541	3	10.17	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	1	0	0	0	0
Cooperstown	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	1	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Oneonta	*7,000	8	13.71	1	12.5	0	0	1	0	0	0	0	0	0	0	0	125.00	2	1	0	0	0	1	1	0	0	1	1
Worcester	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	1	0
Brookfield	3,685	3	9.77	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	1	0	0	0	0
Baldwinsville	*3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
SYRACUSE	*65,000	107	19.75	22	20.6	0	0	1	1	1	0	2	2	0	3	1	102.80	14	18	2	8	4	10	13	2	8	9	8
Skaneateles	4,866	6	14.79	2	33.3	0	0	0	0	0	0	0	0	0	1	0	166.67	1	1	0	1	1	0	0	0	0	0	1
Homer	3,500	4	13.71	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	2	1
Rest of district	....	106	....	15	14.3	0	0	2	1	0	0	6	1	0	6	0	152.38	17	14	2	3	2	7	9	2	3	19	12
WEST CENTRAL DIST:																												
AUBURN	*26,000	27	12.46	3	11.1	1	0	0	1	0	0	0	0	0	0	0	74.07	4	2	0	8	2	3	5	0	0	1	0
Ithaca	*10,000	12	14.40	2	16.7	0	0	2	0	0	0	0	0	0	1	0	250.00	2	2	0	0	0	0	1	0	0	3	1
Waterloo	*4,500	5	13.34	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	1	0	1	0	1	0	0
Seneca Falls	6,853	4	7.00	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	0	2	0	0	0	0	1
Hector	5,025	4	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	0	0	0	1	0
Manchester	*4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	0	0
Phelps	*7,000	2	3.43	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	0
Canandaigua	6,300	10	19.05	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	1	0	3	0	1	0	2
Geneva	*6,000	8	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	4	0	2	1	0	0	0	0	1	0

OSWEGO	*24,000	28	14.00	5	18.9	0	0	2	1	0	0	1	0	0	0	0	142.55	3	6	2	0	1	2	2	0	1	4	3
Fulton	*4,000	7	21.00	0	......	0	0	0	0	0	0	0	1	0	0	0	142.86	0	1	0	0	0	0	2	0	1	1	1
Lyons	*6,000	18	36.00	4	22.2	0	0	0	0	0	0	0	0	1	0	0	55.55	2	2	0	2	0	0	2	3	0	2	4
Arcadia	5,702	10	21.05	1	10.0	1	0	0	1	0	0	0	0	0	0	0	....	0	3	0	0	0	1	1	1	1	1	0
Palmyra	*4,800	8	20.00	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	0	1	1	1	0	1	0
Wolcott	3,753	5	16.00	3	60.0	0	0	0	0	0	0	3	0	0	0	0	600.00	1	1	0	0	0	0	0	0	0	0	0
ROCHESTER	*101,000	153	18.17	39	25.5	0	0	2	0	0	1	0	3	0	13	0	124.18	21	22	2	14	8	8	26	7	5	8	13
Brockport	*4,500	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	0	0	1	0
Mendon	3,200	5	18.75	1	20.0	1	0	0	0	0	0	0	0	0	0	0	200.00	1	0	0	1	0	0	0	0	0	2	0
Brighton	3,736	a9	26.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	1	1	2	0	0	1	0
Albion	*5,000	5	12.00	0	......	0	0	0	0	0	0	0	1	0	0	0	200.00	0	0	0	0	1	1	0	0	1	0	1
LOCKPORT	*16,000	16	12.00	3	18.8	0	0	0	0	0	0	0	0	0	0	0	....	0	4	0	0	0	3	0	0	1	4	4
Tonawanda	4,900	5	12.41	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	2	0	0	0	0	1	0	0	1	0	0
Amherst	4,518	6	16.00	3	50.0	0	0	0	0	0	1	0	0	0	1	0	333.33	2	0	0	0	0	1	0	0	0	2	1
Rest of district	....	110	....	16	15.7	1	0	0	2	0	0	3	0	1	3	0	98.04	13	16	2	5	4	8	11	2	1	22	16
Totals for the State.	....	7,016	....	2,275	32.5	31	0	68	75	1	141	191	44	56	326	106	132.55	1,441	1,019	94	347	395	487	761	81	236	522	564

a Eight deaths occurred in the county hospital.

REMARKS. — For the year completed with the March bulletin the total reported mortality is 77,086, the infant mortality being 37 per cent. The ratio per 1,000 from zymotic diseases is 228.90; from consumption, 141.50; from acute respiratory diseases, 129.00 — in all 50 per cent of the mortality. In 18 cities, of a total population of 2,559,800, the ratio per 1,000 from zymotic diseases is 235.92; from consumption, 145.52; the mortality for the year being 59,859, or 23 38 per 1,000 population. For April the ratio per 1,000 from zymotic diseases is 132.55; from consumption, 132.71; for acute respiratory diseases, 205 71. For March, 291 delayed returns have been received.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during May, 1885.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	2,937	25.53	1,110	23.7	22	1	16	36	0	71	84	14	24	181	82	180.79	474	443	36	136	192	151	256	62	163	211	284
BROOKLYN	*665,602	1,205	21.57	429	35.6	1	0	3	14	0	29	40	5	10	50	35	155.02	216	199	21	57	56	56	129	23	54	27	180
Gravesend	*5,000	9	21.60	1	11.1	0	0	0	0	0	1	0	0	0	0	0	111.11	3	0	0	0	0	0	1	0	0	0	4
New Lots	*17,000	25	16.66	9	36.0	2	0	0	0	0	2	0	0	0	0	0	160.00	7	6	0	0	1	0	3	1	0	0	3
New Utrecht	4,742	4	10.12	1	25.0	0	0	0	0	0	1	0	0	0	0	0	250.00	1	1	0	0	0	0	0	0	1	0	0
Flatlands	3,127	2	7.68	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	0	0	1	0	0	0	0
LONG ISLAND CITY	*21,000	36	20.57	12	33.3	0	0	0	0	0	0	1	0	1	1	1	111.11	9	1	2	4	2	2	5	2	3	2	0
Newtown	*10,000	12	14.40	4	33.3	0	0	0	0	0	0	0	0	0	2	0	166.67	2	0	0	0	0	0	2	1	1	0	4
Oyster Bay	*12,000	16	16.00	7	......	1	0	0	0	0	0	0	0	0	0	0	62.50	4	2	0	1	0	1	3	0	0	1	3
Hempstead	18,160	14	9.30	4	28.5	0	0	0	1	0	0	0	0	0	1	0	142.86	2	0	0	3	1	2	1	1	0	1	1
North Hempstead	*7,000	14	24.00	7	50.0	0	0	0	0	0	0	2	0	0	0	0	142.86	5	1	0	1	1	0	3	0	0	1	0
Jamaica	10,089	15	21.40	5	27.8	0	0	0	0	0	0	1	0	0	1	0	111.11	2	2	0	0	2	5	3	0	2	0	0
Babylon	4,739	5	12.66	0	......	0	0	1	1	0	0	0	0	0	0	0	400.00	0	0	0	0	1	1	1	0	0	0	0
Southold	7,267	9	14.80	2	25.0	0	0	0	0	0	0	2	0	0	0	0	222.22	0	1	0	0	1	1	0	1	2	1	0
Southampton	6,352	6	11.34	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	1	1	0	0	3	0
Northfield	7,014	12	20.58	1	8.4	0	0	0	0	0	0	0	0	0	1	0	83.33	2	2	1	2	0	2	1	0	0	0	1
Westfield	5,289	4	9.07	0	......	1	0	0	0	0	1	0	0	0	0	0	500.00	0	0	0	0	0	0	1	0	1	0	0
YONKERS	*22,000	30	16.36	5	16.6	0	0	0	0	0	0	0	0	0	1	1	33.33	3	4	1	1	3	4	3	2	3	1	3
Westchester	*6,900	8	13.91	2	25.0	1	0	0	0	0	0	0	0	0	1	0	250.00	3	1	0	0	0	0	0	0	0	0	3
Rye	7,500	10	16.00	1	10.0	0	0	1	0	0	0	0	0	0	0	0	100.00	1	0	0	1	0	1	4	0	0	1	1
Sing Sing	*6,500	11	20.31	1	9.0	0	0	0	1	0	0	0	0	0	0	0	90.91	1	3	0	0	1	2	2	0	0	0	1
Rest of district	....	50	....	16	32.0	0	0	0	0	0	0	0	0	0	2	1	60.00	12	13	0	1	3	4	4	1	2	3	4
HUDSON VALLEY DIST.:																												
ALBANY	*93,000	177	22.36	62	35.0	2	0	3	0	0	1	14	1	1	8	2	180.79	27	32	1	5	8	17	21	6	3	6	19
COHOES	*20,000	26	15.60	8	30.8	0	0	2	0	0	0	0	0	0	4	0	230.77	2	9	0	1	2	0	1	1	0	1	3
West Troy	*13,000	19	17.54	3	15.8	0	0	1	0	0	0	0	0	0	0	0	52.63	10	1	0	2	0	1	3	0	0	1	0
Hoosick Falls	*4,000	10	12.00	4	40.0	0	0	0	0	0	0	1	0	0	1	0	200.00	1	2	0	0	0	3	1	0	0	0	1
TROY	*60,000	114	22.80	26	22.8	0	0	1	0	0	0	0	0	0	5	0	52.62	28	23	0	5	4	12	29	2	3	2	0
Lansingburgh	*8,500	20	24.23	6	30.0	0	0	0	0	0	0	0	0	0	2	0	100.00	4	4	0	2	1	0	3	0	0	0	4
Green Island	*5,000	12	28.50	2	16.6	1	0	0	0	0	0	0	0	0	0	0	....	0	4	0	0	1	1	1	0	0	2	3

Greenbush	*7,200	17	28.33	8	47.9	0	0	1	0	0	0	1	0	0	0	0	117.65	1	2	0	0	0	7	0	1	1	0	3
Catskill	*1,500	9	24.00	2	22.2	0	0	0	0	0	0	0	0	0	1	0	111.11	2	2	0	0	0	1	1	0	0	0	2
HUDSON	*10,000	14	16.80	4	25.6	0	0	1	1	0	0	0	0	0	1	1	285.71	0	2	0	1	1	1	1	0	0	0	4
KINGSTON	30,000	28	16.80	7	25.0	0	0	1	2	0	0	0	0	0	0	0	107.15	5	4	0	2	2	5	2	1	0	3	1
Wawarsing	8,547	8	11.23	3	37.5	0	0	0	0	0	0	0	1	0	0	1	250.00	2	0	0	0	0	1	1	0	0	1	1
Rosendale	5,000	1	3.40	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
Marbletown	4,000	4	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	2	1	0	0	0	0
Esopus	4,736	4	10.13	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	1	1
Saugerties	*4,000	5	15.00	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	0	0	0	1	1	0
POUGHKEEPSIE	20,207	35	20.79	7	20.0	0	0	0	1	0	0	1	0	0	0	0	57.14	7	6	1	4	1	2	1	2	2	5	2
Fishkill	10,732	10	11.18	4	40.0	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	1	3	0	1	0	2
Wappinger's Falls	*5,000	5	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	3	0	0	0	0	0	0	0	0	0
NEWBURGH	*20,000	26	15.80	9	34.6	1	0	0	0	0	0	0	0	0	0	0	....	5	9	1	1	1	3	4	0	1	0	0
Port Jervis	*8,800	6	8.19	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	1	0	0	1	0	0	0	0
Middletown	*10,000	21	25.20	3	14.3	0	0	3	3	0	0	0	0	0	3	0	428.57	2	0	0	2	0	1	2	2	0	1	2
Goshen	4,387	9	24.54	1	11.1	0	0	1	0	0	0	0	0	1	0	0	222.22	0	4	0	0	0	0	2	0	0	1	0
Clarkstown	4,378	9	24.55	2	22.2	0	0	0	1	0	0	1	0	0	0	1	222.22	1	2	0	0	1	1	0	0	1	0	0
Orangetown	8,077	9	13.50	3	33.3	0	0	0	0	0	0	0	0	0	1	0	111.11	2	0	0	0	1	2	1	0	0	2	0
Ramapo	5,000	4	9.60	1	25.0	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	0	1	0	0	0	0	2
Rest of district	....	151	....	36	24.5	5	0	2	1	0	1	3	1	0	12	1	174.82	14	20	1	9	7	10	23	7	7	12	15
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	2	6.49	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	0	0
Greenwich	3,861	6	18.65	0	......	0	0	1	0	0	0	0	0	0	0	0	166.67	1	1	0	0	0	1	0	0	0	1	1
Fort Ann	3,262	2	7.35	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	1
Fort Edward	4,680	7	17.95	2	28.6	0	0	0	0	0	0	0	0	1	1	0	285.71	0	0	0	0	0	1	0	0	1	0	3
Queensbury	*10,000	12	14.40	3	25.0	0	0	1	0	0	0	0	0	2	0	0	250.00	1	5	0	0	0	1	0	1	0	0	1
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	0	0
Malone	7,908	19	27.60	7	36.8	0	0	0	0	0	1	0	0	0	2	0	157.90	4	4	0	0	1	0	3	0	0	1	3
OGDENSBURG	*10,400	12	13.81	1	8.3	1	0	0	0	0	0	0	0	0	0	0	....	4	3	0	0	2	2	0	0	0	0	0
Gouverneur	*5,000	7	16.80	3	42.9	1	0	0	0	0	3	0	0	0	0	0	571.43	1	0	0	0	1	0	0	0	0	0	1
Ellisburgh	4,214	5	14.24	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	0	3	0	0	0	0	1	0	0	0	1
WATERTOWN	*13,000	13	12.00	3	23.1	0	0	0	0	0	0	0	0	0	0	0	....	2	1	1	2	2	1	1	0	1	2	0
Cape Vincent	3,143	2	7.64	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	1
Rest of district	....	128	....	21	16.2	1	0	2	1	0	1	3	2	1	8	1	162.60	16	18	4	7	6	10	13	3	3	10	18
MOHAWK VALLEY DIST.:																												
SCHENECTADY	*15,000	24	19.20	6	25.0	0	0	0	0	0	1	0	1	0	2	1	83.33	4	5	0	1	0	2	4	1	1	1	0
Cobleskill	3,371	3	10.68	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	1	0
Middleburgh	3,376	3	21.32	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	2	0	0	2	0	0	0	1
Amsterdam	*13,000	10	9.23	3	30.0	1	0	0	0	0	0	1	0	0	0	0	100.00	2	2	0	2	0	0	1	0	0	0	1
Johnstown	*6,000	5	10.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	1	1	0	1	0
Gloversville	*8,000	10	15.00	3	30.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	1	2	0	1	2	0	0
Little Falls	*7,300	6	9.86	2	33.0	1	0	0	0	0	0	0	0	0	1	0	....	0	1	0	0	0	0	0	0	0	3	0
Ilion	*4,500	1	2.67	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
UTICA	*39,000	77	23.18	20	25.9	0	0	2	0	0	0	0	0	0	3	2	100.00	10	13	0	2	7	13	10	0	0	6	9
ROME	12,045	16	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	3	3	1	0	0	1	4	0	0	1	3
Boonville	4,000	4	12.00	3	75.0	0	0	0	0	0	0	1	0	0	1	0	500.00	1	0	0	0	0	1	0	0	0	0	0
Camden	3,400	1	3.53	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	0	0
Waterford	4,328	10	27.72	3	30.0	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	1	0	0	3	0	0	1	0
Milton	5,565	8	17.25	0	......	0	0	0	0	0	1	0	0	0	0	0	125.00	1	3	0	1	0	1	0	1	0	0	0
Saratoga Springs	*10,000	18	21.60	0	......	0	0	0	0	0	0	0	1	0	0	0	55.56	3	4	0	2	0	2	1	1	1	3	0
Rest of district	....	62	....	10	16.0	0	0	1	0	0	0	2	1	0	0	1	80.65	11	8	1	6	1	3	10	3	2	8	4
SOUTHERN TIER DIST.																												
BINGHAMTON	*20,000	19	11.40	2	10.5	0	0	1	3	0	0	0	0	0	0	0	105.26	2	1	0	0	1	2	3	1	0	1	4

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
Candor	4,323	6	16.65	0	......	0	0	0	0	0	0	0	0	0	1	0	166.67	1	0	0	1	0	0	0	1	0	1	1
ELMIRA	*25,000	27	12.96	7	25.9	0	0	0	0	0	0	0	0	0	0	1	....	5	2	0	2	0	1	6	2	1	0	7
Horseheads	3,500	6	20.56	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	1	0	0	0	0	1	0	1
Hornellsville	*10,000	10	12.00	4	40.0	0	0	0	0	0	0	1	0	1	0	0	200.00	0	3	1	0	0	0	0	0	2	0	2
Bath	7,400	11	16.35	1	10.0	0	0	0	0	0	0	0	0	0	3	0	363.64	1	2	0	0	1	2	0	2	0	0	0
Olean	*8,000	17	25.50	8	47.0	1	0	0	0	0	0	3	0	1	2	0	411.77	1	0	0	0	0	0	4	0	0	3	2
Jamestown	*12,000	11	11.00	3	27.3	0	0	0	0	0	0	0	1	0	0	0	90.91	0	2	2	1	0	3	1	0	1	0	0
Westfield	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	91	....	12	13.2	0	0	1	0	0	1	1	1	1	1	1	76 93	13	10	5	6	3	10	11	6	3	9	8
EAST CENTRAL DIST.:																												
Franklin	*3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
Delhi	3,600	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	0	0
Walton	3,541	5	16.94	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	1	1	0	0	0	0	1
Cooperstown	*3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Oneonta	*5,000	8	19.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	1	1	1	0	0	0	1	0	3
Cazenovia	4,363	6	16.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	3	0	0	0	1
Baldwinsville	*3,000	0	....	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	0
SYRACUSE	*65,000	82	15.14	24	29.3	4	0	0	0	0	1	0	0	1	4	0	121.96	12	18	0	5	1	3	14	0	5	2	12
Geddes	7,000	4	6.86	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	1	0	1	0	0
Rest of district	....	23	....	1	4.3	0	0	0	0	0	1	0	0	0	0	0	43.48	4	3	0	2	0	0	1	3	4	2	3
WEST CENTRAL DIST.:																												
AUBURN	*28,000	33	15.23	5	15.2	1	0	1	0	0	0	0	1	0	0	0	90.91	4	9	1	1	0	1	9	3	1	0	1
Ithaca	*10,000	5	6.00	4	80.0	0	0	0	0	0	0	0	0	0	2	0	400.00	0	0	0	0	1	0	1	0	0	0	1
Waterloo	*4,500	10	26.67	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	1	1	0	4	2	0
Seneca Falls	6,853	2	3.50	0	......	0	0	0	1	0	0	0	0	0	0	0	500.00	1	0	0	0	0	0	0	0	0	0	0
Groton	3,450	4	13.91	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	1	0	0	0	1
Hector	5,025	3	7.20	0	......	0	0	0	1	0	0	0	0	0	0	0	333.33	1	0	0	0	0	1	0	0	0	0	0
Manchester	*4,000	1	3.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Phelps	*7,000	7	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	1	0	0	0	2	0	0	2	0
Canandaigua	*6,300	1	2.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	0	0
Geneva	*6,000	9	18.00	5	55.5	0	0	0	0	0	0	0	0	1	1	0	222.22	1	2	0	1	0	1	1	0	0	0	1
Attica	3,100	4	15.50	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	[illegible]	0	[illegible]	0	0	0	0	[illegible]
Penn Yan	*4,500	5	13.33	0	......	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Lima	*2,800	4	17.14	2	50.0	0	0	0	0	0	0	0	0	0	3	0	750.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	76	....	9	11.8	1	0	2	3	0	0	1	1	0	0	2	131.58	2	16	1	9	3	6	10	3	5	7	4
LAKE ONTARIO & WESTERN DISTRICT:																												
OSWEGO	*24,000	28	14.00	8	28.5	0	0	2	1	0	0	0	0	0	1	0	142.85	6	4	1	1	0	1	4	0	1	3	3
Fulton	*4,000	4	12.00	0	......	1	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	0	0	0	0	1
Lyons	*6,000	8	16.00	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	2	0	2	1	0	3
Arcadia	5,702	10	21.05	1	10.0	0	0	0	1	0	0	0	0	0	0	0	100.00	0	1	1	0	1	1	0	0	2	1	2
Palmyra	*4,800	5	12.50	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	1	2	1
Wolcott	3,753	4	12.79	1	25.0	1	0	0	0	0	0	0	0	0	0	0	250.00	0	0	0	1	0	0	0	0	0	1	1
ROCHESTER	*101,000	159	18.90	38	23.9	0	0	0	0	0	0	0	6	0	2	1	56.60	24	30	5	9	7	7	27	1	9	3	28
Brockport	*4,500	2	5.33	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	1	0	0	0	0
Mendon	3,200	5	18.75	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	1	0	1	0	0	1	0
Brighton	3,736	7	22.46	0	......	0	0	1	0	0	0	0	0	0	0	0	142.86	1	1	0	0	0	0	1	0	1	2	0
Albion	*5,000	4	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	0	2
LOCKPORT	*16,000	13	9.75	2	15.4	0	0	0	0	0	0	0	1	0	0	0	76.92	1	4	0	0	0	0	3	0	0	0	4
Tonawanda	4,900	4	9.80	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	1	0	1	0	0	0	0	0
Amherst	4,518	2	5.33	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	1	0
Hamburg	3,235	7	25.96	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	9	1	0	2	1	0	1	0	1	0	1
Rest of district	....	116	....	26	22.8	3	0	2	1	0	5	1	0	1	1	0	122.80	14	16	2	12	3	10	13	8	3	6	15
Totals for the State.	....	6,542	....	2,094	32.2	53	1	55	74	0	122	165	38	47	319	136	154.70	1,638	1,033	94	331	345	407	707	161	312	387	717

REMARKS.— The total reported mortality for the month is 6,542; the percentage of infant mortality is 32.23 The ratio per 1,000 of deaths from zymotic diseases is 154.70, that from measles being 26.83; from scarlet fever, 18.70, and from croup and diphtheria, 48.91. The ratio per 1,000 of deaths from consumption is 157.77, and from acute respiratory diseases, 158.70. For the month of April the number of delayed returns received since last Bulletin was issued is 160; from Albany 13 additional deaths for April are reported.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during June, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	2,824	24.25	1,290	45.7	13	1	17	37	3	53	73	16	22	177	307	254.25	334	376	35	146	173	141	267	67	133	181	251
BROOKLYN	*665,602	1,275	22.84	675	52.9	0	0	4	17	0	33	25	5	10	51	304	273.72	150	138	17	64	51	76	122	24	85	22	127
Gravesend	*5,000	a5	12.00	2	40.0	0	0	0	0	0	0	0	0	0	0	1	a200.00	0	0	0	0	0	0	3	0	0	0	1
New Lots	*17,000	38	25.33	14	39.5	0	0	0	0	0	2	0	0	0	1	3	157.89	3	7	0	2	2	1	9	0	1	4	3
New Utrecht	4,742	8	20.24	2	25.0	0	0	0	0	0	0	0	0	0	0	1	125.00	1	1	0	0	1	1	2	0	0	0	1
Flatlands	3,127	5	19.19	4	80.0	0	0	0	0	0	0	0	0	0	0	2	400.00	0	1	0	0	0	0	2	0	0	0	0
Newtown	*10,000	18	21.80	10	55.5	0	0	0	2	0	0	0	0	0	3	2	388.89	0	3	1	0	0	0	8	1	0	0	3
Oyster Bay	*12,000	14	14.00	5	84.3	0	0	1	0	0	0	0	0	0	0	1	142.85	0	1	0	0	1	1	5	1	1	2	0
North Hempstead	*7,000	6	10.29	3	50.0	0	0	0	0	0	1	0	0	0	0	0	166.67	1	0	0	1	0	1	0	0	2	0	0
Jamaica	10,089	15	18.00	3	20.0	0	0	0	1	0	0	0	0	0	0	0	66.67	1	1	0	0	1	4	3	0	2	0	2
Babylon	4,739	2	4.53	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	0	1
Southold	7,267	7	11.54	0	.....	0	0	0	0	0	1	0	0	0	0	0	....	0	2	0	0	2	0	0	0	1	1	1
New Brighton	....	a26	....	5	19.2	0	0	0	0	0	0	0	0	0	1	0	579.92	2	3	0	3	3	6	1	0	2	2	2
Southampton	6,352	5	9.50	0	......	0	0	1	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	0	0	0	1	0
Northfield	7,014	2	3.43	0	....	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	1	0	0	0	0	0
Westfield	5,289	5	11.80	3	60.0	0	0	0	0	0	0	0	0	0	1	0	200.00	2	0	0	0	0	1	0	0	1	0	0
YONKERS	*22,000	31	16.91	17	54.8	3	0	0	0	0	1	0	1	0	0	6	355.00	0	4	1	2	2	2	6	0	1	1	1
Westchester	*6,900	8	13.91	1	12.5	0	0	0	0	0	0	0	0	0	1	0	125.00	1	2	1	0	0	1	0	0	0	1	1
Mount Vernon	*5,000	10	24.00	9	90.0	0	0	0	1	0	0	0	0	0	0	1	200.00	0	4	1	1	0	0	0	0	0	0	2
Rye	*7,500	3	4.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	1	1	2
Sing Sing	*6,500	9	16.62	2	22.2	0	0	0	0	0	0	0	1	0	0	1	222.22	1	1	0	1	0	1	0	0	3	0	0
Rest of district	....	81	....	23	......	0	0	0	0	0	1	0	0	0	1	1	....	11	10	1	6	7	6	14	2	5	4	12
HUDSON VALLEY DIST.:																												
ALBANY	*95,000	154	19.45	65	42.2	2	0	2	0	0	1	13	0	2	11	8	311.68	9	23	2	4	7	19	10	9	9	4	19
COHOES	*20,000	24	14.40	7	29.2	0	0	1	0	0	0	0	0	0	2	0	125.00	1	5	0	2	1	1	0	2	1	2	6
West Troy	*13,000	16	14.77	5	31.2	0	0	2	0	0	0	0	0	0	0	0	125.00	1	1	0	1	3	1	2	1	2	0	2
Hoosick Falls	*4,000	4	12.00	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	1	0	0	0	0	0	1	0	0	0
TROY	*60,000	81	16.20	19	23.5	5	0	2	0	0	0	0	0	0	2	2	148.15	4	16	5	4	7	9	13	2	1	7	1
Lansingburgh	8,500	20	28.23	5	25.0	0	0	0	0	0	0	0	0	0	4	0	200.00	1	1	0	0	3	7	0	1	0	0	8

Green Island	*5,000	11	26.40	5	45.5	3	0	0	0	0	0	0	0	0	0	0	272.72	0	0	2	0	0	0	0	1	1	1	8
Greenbush	7,200	9	15.00	3	33.3	0	0	1	0	0	0	0	0	0	1	0	222.22	0	1	0	2	0	1	1	0	1	0	1
Catskill	*4,800	4	10.67	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	0	0	0	0	1
HUDSON	*10,000	16	19.20	4	25.0	0	0	0	0	0	1	0	1	0	5	0	437.60	2	1	0	0	0	3	2	0	2	0	0
KINGSTON	20,000	29	17.40	15	51.7	1	0	0	1	0	0	1	0	1	4	1	310.34	5	2	1	1	0	4	4	0	2	1	0
Wawarsing	8,547	11	15.45	1	9.1	0	0	0	0	0	2	0	0	0	0	1	272.72	0	2	0	0	0	1	2	1	1	0	1
Rosendale	5,000	7	16.80	1	14.3	1	0	0	1	0	0	0	0	0	0	0	285.71	2	0	0	0	0	3	0	0	0	0	0
Marbletown	4,000	2	6.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	1
Esopus	4,736	2	5.07	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	1
Saugerties	4,000	3	9.00	0	......	0	0	1	0	0	0	0	0	0	0	0	833.33	1	0	0	0	0	0	0	0	0	0	1
POUGHKEEPSIE	20,207	20	11.88	2	10.0	1	0	1	0	0	0	0	0	0	0	0	100.00	3	2	0	2	1	2	5	1	0	1	1
Fishkill	10,732	13	15.55	2	15.4	0	0	0	0	0	0	0	0	0	3	1	307.70	1	3	0	0	1	2	0	0	0	0	2
Wappinger's Falls	5,000	6	14.40	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	1	1	0	0	0	1	1	0	0	0	1
NEWBURGH	20,000	27	16.20	11	40.8	0	0	0	0	0	0	1	0	0	1	3	185.18	4	3	0	1	1	2	5	2	1	2	1
Port Jervis	8,500	11	15.52	3	28.6	0	0	1	0	0	0	0	0	0	0	0	90.91	0	3	0	0	0	1	2	0	1	2	1
Middletown	10,000	20	24.00	5	25.0	0	0	0	0	0	0	0	1	0	0	0	50.00	2	0	0	2	1	0	13	0	1	0	0
Goshen	4,387	6	16.41	3	50.0	0	0	0	1	0	0	0	0	2	0	0	500.00	0	2	0	0	0	0	0	0	1	0	0
Haverstraw	7,000	15	25.71	2	13.3	0	0	0	1	0	0	0	0	1	0	0	155.55	2	5	0	1	0	0	1	0	1	0	3
Ramapo	5,000	4	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	1	0	1	0
Rest of district	....	147	....	24	......	0	0	3	1	0	1	2	1	0	6	2	....	9	24	0	10	10	18	27	6	5	10	12
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	2	16.49	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	0	0
Greenwich	3,861	3	9.32	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	0	1
Fort Ann	4,267	3	8.41	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	1	0	0	0	0	0	0	0
Fort Edward	4,680	3	7.10	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	0	1
Queensbury	10,000	14	16.80	7	50.0	0	0	0	0	0	0	0	0	0	1	0	71.42	2	0	0	0	0	3	3	0	0	0	5
Crown Point	4,287	2	5.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	1
Moriah	7,379	4	6.50	1	25.0	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	1	1	0	0	0	0	1
Malone	7,908	15	22.78	8	53.3	0	0	0	0	0	0	0	0	0	4	1	333.33	0	1	1	0	0	1	2	0	0	2	3
OGDENSBURG	*11,000	21	22.90	7	33.3	1	0	0	0	0	0	1	0	0	2	0	142.86	1	2	0	0	0	4	1	1	2	3	3
Gouverneur	5,000	8	19.20	2	25.0	1	0	0	0	0	0	0	0	0	3	0	375.00	1	0	0	0	0	0	3	0	0	0	0
Ellisburgh	4,214	2	5.72	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	1
WATERTOWN	*13,000	16	14.77	4	25.0	0	0	0	0	0	0	1	0	0	1	2	250.00	0	5	0	0	1	2	2	0	2	0	0
Cape Vincent	3,143	2	8.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	2	0	0	0	0	0
Rest of district	....	92	....	20	21.8	1	0	0	2	0	0	0	0	0	8	3	152.18	9	11	1	5	9	5	12	4	6	9	7
MOHAWK VALLEY DIST.:																												
SCHENECTADY	*15,000	28	22.40	3	10.7	0	0	1	0	0	0	0	0	0	1	0	71.43	5	5	2	2	0	5	5	0	2	0	0
Cobleskill	3,371	9	32.04	1	11.1	0	0	0	0	0	0	0	0	0	1	0	111.11	1	0	0	1	0	0	3	1	1	1	0
Middleburgh	3,376	3	10.64	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1	0	1	0	0
AMSTERDAM	13,000	13	12.00	3	53.8	1	0	0	0	0	0	0	0	0	1	0	153.85	0	4	0	0	2	0	2	0	0	1	2
Johnstown	*6,000	1	2.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Gloversville	*8,000	7	10.50	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	1	1	0	0	0	0	2
Little Falls	7,300	5	8.22	2	40.0	0	0	0	0	0	0	1	0	0	0	0	200.00	1	1	0	0	1	0	1	0	0	0	0
Ilion	4,500	7	10.89	2	28.6	0	0	0	0	0	0	2	0	0	0	0	285.71	0	1	0	1	0	0	0	0	0	2	1
Herkimer	3,600	6	20.00	2	33.3	0	0	2	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	1	0	3	0	0
UTICA	*39,000	43	13.23	7	16.3	0	0	0	0	0	0	1	0	0	1	1	70.00	4	9	0	2	0	0	11	2	2	3	2
ROME	12,045	14	14.00	2	14.3	0	0	0	0	0	0	1	0	0	0	0	71.43	1	0	0	0	0	0	3	2	2	5	0
Boonville	4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	1	0	0	0	0	0	2	0	0	1	0
Camden	3,400	1	3.53	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Waterford	4,328	8	22.17	4	50.0	0	0	0	0	0	0	0	0	2	0	0	250.00	1	1	0	0	0	0	1	0	1	1	1
Milton	5,565	12	25.96	2	16.7	0	0	0	0	0	0	0	0	0	2	0	166.67	0	3	0	2	0	0	0	2	0	2	1
Saratoga Springs	*10,000	20	24.00	2	10.0	0	0	1	0	0	0	0	1	0	0	0	100.00	1	1	0	3	1	1	2	1	1	5	2
Rest of district	....	39	....	5	12.8	0	0	0	0	0	0	0	0	0	0	0	....	3	7	0	4	2	6	6	1	3	6	1

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhoeal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhoeal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
BINGHAMTON	*20,000	25	15.00	7	28.0	0	0	2	0	0	0	0	0	0	0	2	160.00	0	5	0	1	0	3	9	1	1	1	0
Candor	4,323	1	2.78	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
ELMIRA	*25,000	22	10.56	3	13.6	0	0	1	0	0	0	0	0	0	0	1	90.90	2	4	0	6	2	1	4	0	1	0	0
Horseheads	3,500	2	6.86	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	1
Hornellsville	*10,000	4	4.80	0	......	0	0	0	0	0	0	1	0	0	0	0	250.00	0	1	0	0	0	1	0	1	0	0	1
Bath	7,400	10	16.22	2	20.0	0	0	0	0	0	0	0	0	1	3	0	400.00	1	1	0	1	0	2	0	0	0	1	0
Olean	*8,000	13	17.00	6	46.2	0	0	0	0	0	0	2	0	1	0	3	461.54	2	1	0	0	0	0	1	1	0	1	1
Jamestown	*12,000	11	11.00	1	9.1	0	0	0	1	0	0	0	0	0	0	1	181.81	0	3	0	1	1	3	0	0	0	0	1
Westfield	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	1	0
Fredonia	2,800	7	30.00	0	......	0	0	0	0	0	0	1	0	0	0	0	142.86	0	0	0	1	0	0	0	1	0	4	0
Rest of district	....	46	....	3	6.5	0	0	0	0	0	1	0	1	0	0	2	87.39	2	7	3	0	2	5	11	2	3	3	4
EAST CENTRAL DIST.:																												
Franklin	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	0
Walton	3,541	5	16.94	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	1	1	0	0	0	0
Cooperstown	*3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	1	0	1	0	0	0	1
Oneonta	*5,000	2	4.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	0	0	0	0	0
Worcester	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Cazenovia	4,363	3	8.30	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	1	1
Brookfield	3,685	2	6.51	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	1	0	0	0	0
Baldwinsville	*3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
SYRACUSE	*65,000	51	9.42	17	33.3	0	0	0	1	0	1	0	0	1	0	2	98.04	6	7	0	6	3	4	6	2	1	2	9
Geddes	7,000	5	8.57	1	20.0	0	0	0	1	0	0	0	0	0	0	0	200 00	1	1	0	0	0	1	1	0	0	0	0
Homer	*3,500	2	6.86	0	......	0	0	0	0	0	0	1	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	69	....	11	14.5	1	0	1	1	0	2	0	1	0	1	0	101.45	2	4	0	12	3	10	7	4	5	9	6
WEST CENTRAL DIST.:																												
AUBURN	*26,000	e26	12.00	6	23.1	2	0	0	0	0	0	0	0	0	2	2	e230.77	0	5	0	1	0	3	3	1	1	1	5
Ithaca	*10,000	12	14.40	3	25.0	0	0	0	0	0	0	0	0	0	2	0	166.66	0	0	2	0	0	0	2	2	0	2	2
Waterloo	*4,500	6	16.00	1	16.7	0	0	0	0	0	0	0	1	0	0	1	333.33	0	2	0	0	2	0	1	0	0	1	0
Seneca Falls	6,853	5	8.75	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	2	0
Hector	5,025	1	2.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	3	0	0	0	0	0	0	1
Manchester	*4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Phelps	*7,000	1	1.71	0	......	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Geneva	*6,000	11	21.00	2	18.2	1	0	0	1	0	0	0	0	0	0	0	181.82	0	1	0	0	0	2	2	0	1	3	1
Penn Yan	4,500	2	5.33	0	......	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	1	0	0	0	0
Lima	*2,800	5	21.43	0	......	0	0	0	0	0	0	0	0	0	1	0	200.00	0	0	0	0	1	0	1	1	0	1	0
Rest of district	....	64	....	5	7.8	1	0	2	2	0	0	0	1	1	0	1	125.00	6	10	0	2	2	4	12	2	2	9	7
LAKE ONTARIO & WESTERN DISTRICT:																												
OSWEGO	*21,000	24	12.00	4	16.7	0	0	1	3	0	0	0	0	0	0	0	166.67	1	4	0	0	2	4	3	1	1	1	3
Fulton	*4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	0	0	0	0	0
Lyons	*5,000	7	14.00	1	14.3	0	0	0	0	0	0	0	0	0	0	1	142.86	1	0	0	1	0	0	1	1	1	1	0
Sodus	*4,800	6	13.61	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	0	0	1	0	1	1	0	1
Wolcott	3,753	4	12.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	1	1	0
ROCHESTER	*101,000	133	15.80	37	27.8	0	0	1	0	0	1	0	1	0	7	3	97.74	12	23	1	7	7	8	27	4	7	3	21
Brockport	4,500	5	13.33	1	20.0	0	0	1	0	0	0	0	0	0	0	0	200.00	1	0	0	0	0	0	1	1	0	1	0
Greece	3,200	3	7.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	1	0	0
Brighton	3,736	c2	7.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	1
Albion	*5,000	3	7.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	1	1
LOCKPORT	*16,000	d2	1.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	1	0
Tonawanda	4,900	4	9.80	1	25.0	0	0	0	0	0	0	1	0	0	0	0	250.00	0	1	0	0	0	0	0	1	0	0	1
Amherst	4,518	6	16.00	1	16.7	0	0	1	0	0	0	0	0	0	0	0	166.67	1	2	0	0	0	1	0	0	0	1	1
Aurora	3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	1
Hamburg	3,235	5	18.52	1	20.0	0	0	0	0	0	3	0	0	0	0	0	600.00	1	1	0	0	0	0	0	0	0	0	1
Rest of district	....	100	....	13	13.0	0	0	3	0	0	1	0	0	1	2	2	90.00	8	10	1	7	3	13	15	[illegible]	5	11	12
Totals for the State.	....	6,204	....	2,483	40.0	37	1	54	74	3	106	128	32	46	319	680	238.55	643	814	78	334	328	432	703	172	277	356	587

REMARKS.— The total reported mortality for the month is 6,204, the percentage of infant mortality is 40.0. The number of deaths from zymotic diseases is 1,480, the ratio per 1,000 to deaths from all causes being 238.55. The ratio per 1,000 of deaths from diarrhœal diseases, the total mortality from which cause is just five times greater than in May, is 109.61; from croup and diphtheria, 51.42; from acute respiratory diseases, 103.64 per 1,000 deaths occurred, and from consumption 131.20. For the month of May 244 delayed returns have been received since the last Bulletin was issued, 53 of which are under five years of age.

a Seven deaths in public institutions. *b* Six deaths in public institutions. *c* Eight deaths in public institutions. *d* Returns manifestly far from correct. *e* Two deaths in public institutions.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during July, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	....	6,959	....	4,216	60.5	19	2	27	67	4	65	66	13	63	199	2617	422.76	373	597	65	462	277	235	718	100	227	252	511
NEW YORK CITY	*1,397,395	4,312	37.03	2,516	68.3	16	2	19	34	2	35	52	8	49	151	1472	426.71	243	401	44	300	192	139	438	66	136	188	325
BROOKLYN	*665,602	2,052	37.00	1,338	65.2	0	0	7	25	0	25	12	3	9	37	898	495.13	113	155	17	156	69	74	231	26	61	35	119
Gravesend	*5,000	a27	64.80	33	85.5	0	0	0	1	0	0	0	0	0	1	15	630.00	0	0	0	4	0	1	3	0	1	0	1
New Lots	*19,000	47	29.68	34	72.3	1	0	0	1	1	2	0	0	2	1	18	553.19	0	0	1	2	4	2	2	0	4	2	4
New Utrecht	4,742	15	37.96	6	40.0	0	0	0	0	1	0	1	0	1	0	2	266.67	1	1	0	0	0	0	3	2	2	0	2
Flatlands	3,127	9	34.50	5	55.5	0	0	0	0	0	0	0	0	0	0	3	333.33	0	1	0	0	0	1	0	0	1	0	3
LONG ISLAND CITY	*21,000	64	36.57	36	66.2	0	0	0	0	1	0	0	0	0	2	25	437.60	2	5	0	4	2	3	6	1	3	0	10
Newtown	*10,000	37	44.40	29	78.4	0	0	0	0	0	0	0	0	0	2	16	486.48	1	2	0	0	0	0	3	0	1	2	10
Oyster Bay	*12,000	20	20.00	13	65.0	0	0	0	0	0	0	0	0	0	0	10	500.00	0	3	0	3	0	1	0	0	1	0	2
Hempstead	18,160	17	11.32	8	47.0	0	0	0	0	0	0	0	0	1	0	6	411.75	0	2	0	2	0	0	0	0	1	1	4
North Hempstead	*7,000	19	32.57	11	57.9	0	0	0	0	0	0	0	0	0	0	7	358.00	2	0	0	2	0	1	3	0	2	2	0
Jamaica	10,089	41	48.71	27	65.9	0	0	1	0	0	2	0	0	0	1	23	658.54	0	2	1	0	0	2	1	1	2	3	2
Babylon	4,739	3	7.17	0	......	0	0	0	0	0	0	0	0	0	1	0	333.33	0	0	0	0	1	0	1	0	0	0	0
Southold	7,267	10	16.51	5	50.0	1	0	0	0	0	0	1	0	0	0	0	200.00	0	0	0	0	0	1	2	1	1	2	1
Southampton	6,352	10	18.89	2	20.0	0	0	0	0	0	0	0	1	0	0	0	100.00	1	0	0	1	2	2	1	0	0	2	0
Northfield	7,014	18	30.79	11	61.1	0	0	0	0	0	0	0	0	0	0	9	500.00	1	1	0	2	0	0	3	0	1	0	1
Westfield	5,289	17	38.11	14	82.4	0	0	0	1	0	0	0	0	0	0	10	646.06	0	3	0	1	1	0	0	0	0	1	0
YONKERS	*22,000	71	38.64	46	64.8	0	0	0	1	0	0	0	0	0	0	36	521.12	0	5	1	1	2	2	6	2	2	2	11
Westchester	*6,900	13	22.61	6	46.1	0	0	0	2	0	0	0	0	0	0	5	539.23	0	0	0	0	0	1	0	0	3	0	2
Mount Vernon	*5,000	b20	48.00	9	45.0	0	0	0	0	0	1	0	0	0	0	4	250.00	1	1	0	1	1	0	4	0	0	4	3
Rye	3,500	6	20.57	3	50.0	0	0	0	0	0	0	0	0	0	0	3	500.00	1	1	0	0	0	1	0	0	0	0	0
Sing Sing	*6,500	23	42.46	11	47.9	0	0	0	0	0	0	0	0	0	0	10	434.79	1	2	0	0	0	3	3	0	1	0	3
Rest of district	....	108	....	63	58.3	1	0	0	2	0	0	0	1	1	3	45	490.74	6	12	1	3	3	1	8	1	4	8	8
HUDSON VALLEY DIST.:																												
Totals	....	880	....	351	40.0	6	..	17	14	..	13	15	...	3	23	172	300.00	34	107	10	52	26	59	123	24	48	53	81
ALBANY	*96,336	194	24.17	91	46.9	0	0	3	1	0	3	9	0	0	10	29	273.19	3	19	0	18	10	14	22	5	16	7	25
COHOES	*20,000	45	27.00	28	62.2	0	0	0	1	0	0	0	0	0	0	15	355.55	0	4	0	2	0	2	8	1	3	3	6
West Troy	*13,000	31	28.61	15	48.4	0	0	0	0	0	1	0	0	0	1	11	419.35	3	1	0	2	0	1	6	0	2	1	2
Hoosac Falls	*4,000	11	33.3	4	36.4	1	0	0	0	0	0	0	0	0	0	1	181.81	0	2	0	1	0	0	4	0	0	0	2
TROY	*60,000	127	25.40	50	39.3	3	0	5	0	0	1	1	0	0	0	31	322.83	7	27	3	7	4	8	15	4	6	3	3

Lansingburgh	a8,500	17	24.00	4	23.5	0	0	1	0	0	1	0	0	0	0	3	294.12	1	3	0	1	0	3	0	0	0	3	1
Green Island	*5,000	8	19.20	5	62.5	0	0	0	0	0	0	0	0	0	0	4	500.00	1	0	0	1	0	2	0	0	0	0	0
Greenbush	7,200	14	23.33	7	50.0	1	0	0	0	0	0	0	0	0	0	3	285.71	2	0	0	3	1	0	1	1	0	1	1
Catskill	*4,500	1	2.67	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	0
HUDSON	*10,000	25	30.00	7	28.0	0	0	0	0	0	1	0	0	0	5	3	360.00	1	2	-0	1	3	3	2	0	2	0	2
KINGSTON	20,000	51	30.60	29	56.9	0	0	1	1	0	0	3	0	1	2	17	509.80	4	5	0	2	1	7	3	0	1	3	0
Wawarsing	8,547	9	12.63	4	44.5	0	0	0	0	0	1	0	0	0	0	2	333.33	0	0	0	0	1	0	4	0	0	1	0
Rosendale	*5,000	1	2.40	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Marbletown	4,000	4	12.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	2
Esopus	4,736	4	10.21	3	75.5	0	0	0	0	0	0	0	0	0	0	2	500.00	0	1	0	0	0	0	0	0	0	0	1
Saugerties	*4,000	5	15.00	0	......	0	0	0	2	0	0	0	0	0	0	0	400.00	0	0	0	0	0	0	0	0	1	2	0
POUGHKEEPSIE	20,207	41	24.30	16	39.0	0	0	1	3	0	0	0	0	0	1	6	268.30	0	5	0	1	0	2	10	2	0	7	3
Fishkill	10,732	12	13.35	2	10.0	0	0	0	1	0	0	0	0	0	0	0	....	0	2	1	0	0	2	0	0	1	2	3
Wappinger's Falls	*5,000	3	7.20	3	100.0	0	0	0	0	0	2	0	0	0	0	0	666.66	0	0	0	0	0	0	1	0	0	0	0
NEWBURGH	20,000	38	22.80	21	55.2	0	0	0	1	0	0	1	0	0	0	10	315.79	2	4	0	2	1	1	10	0	3	3	0
Port Jervis	*9,000	14	18.67	2	14.3	0	0	1	0	0	0	0	0	0	0	0	71.43	0	2	0	2	0	1	2	0	1	0	5
Middletown	*10,000	10	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	1	100.00	0	1	0	1	0	1	5	0	1	0	0
Goshen	4,387	7	19.15	1	14.3	0	0	0	0	0	0	0	0	1	0	1	285.71	0	2	0	0	0	0	1	1	0	1	0
Haverstraw	7,000	11	18.83	5	45.5	0	0	0	0	0	0	0	0	0	0	4	363.64	0	0	0	1	0	0	1	0	1	1	*3
Ramapo	*5,000	7	16.80	2	28.6	0	0	1	0	0	0	0	0	0	0	1	285.71	1	1	1	2	0	0	0	0	0	0	0
Rest of district	....	190	....	51	26.8	1	0	4	4	0	3	1	0	1	4	28	242.10	9	25	5	5	5	12	27	10	10	13	23
ADIRONDACK & NORTHERN DIST.: Totals	....	158	....	42	26.6	4	..	1	1	...	1	3	...	5	10	14	246.83	5	21	4	9	7	11	18	7	11	13	13
Greenwich	3,861	6	18.65	4	66.7	0	0	0	0	0	0	0	0	3	0	1	466.67	0	0	0	0	0	0	0	0	2	0	0
Fort Ann	4,267	6	16.87	0	......	1	0	0	0	0	0	0	0	0	0	0	166.67	0	0	0	0	1	1	0	0	2	0	1
Queensbury	*10,000	14	16.80	6	42.8	0	0	0	0	0	0	0	0	0	0	5	357.14	0	2	0	1	0	0	1	1	1	0	3
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	1	0	0	0
Port Henry	2,525	3	14.26	2	66.6	0	0	0	0	0	0	0	0	0	2	0	666.67	0	0	0	1	0	0	0	0	0	0	0
Malone	7,908	4	6.10	2	50.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	1	0	0	1	0	0	0	0	0	0
OGDENSBURGH	*11,000	16	17.45	2	12.5	1	0	0	0	0	0	0	0	0	0	1	125.00	0	4	0	0	0	4	3	0	0	1	2
Gouverneur	*5,000	7	16.80	2	28.6	1	0	0	0	0	0	0	0	0	2	1	571.43	0	1	0	0	1	1	0	0	0	0	0
Plattsburgh	....	c6	....	2	33.3	0	0	0	0	0	0	2	0	0	1	0	500.00	0	2	0	0	0	0	0	0	0	1	0
Ellisburgh	4,812	4	10.00	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	0	1	0	0	0	0	1	1	0	0	0
WATERTOWN	*13,000	14	12.92	4	28.6	0	0	0	0	0	0	0	0	0	1	1	142.86	0	3	1	1	1	2	3	0	0	0	1
Cape Vincent	3,143	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	2	0	0	0	0
Rest of district	....	73	....	16	22.2	1	0	1	1	0	1	1	0	2	3	3	181.40	4	7	3	6	3	2	8	4	6	11	6
MOHAWK VALLEY DIST.: Totals	....	252	....	73	29.0	3	...	3	...	...	1	1	1	...	14	36	226.19	10	34	7	20	7	15	40	9	13	25	15
SCHENECTADY	*15,000	24	19.20	11	45.8	0	0	2	0	0	1	0	0	0	2	8	541.67	0	6	2	1	1	1	0	0	0	0	0
Cobleskill	3,371	1	3.86	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
AMSTERDAM	13,000	24	22.15	16	66.7	0	0	0	0	0	0	1	0	0	0	8	375.00	2	1	1	0	0	0	5	0	2	2	2
Johnstown	*6,000	6	12.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	2	1	0	0	1	0
Gloversville	*8,000	7	10.50	2	28.6	0	0	0	0	0	0	0	0	0	0	1	142.86	0	1	0	1	1	0	2	0	0	1	0
Little Falls	*7,300	9	14.80	2	22.2	1	0	0	0	0	0	0	0	0	0	0	....	1	0	1	0	0	0	2	0	3	0	1
Ilion	*4,500	8	21.33	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	1	2	0	0	0	0	1	0	2
Herkimer	*3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	1	0	0	0	0
UTICA	*39,000	62	19.08	15	24.2	0	0	0	0	0	0	0	0	0	7	7	225.80	3	5	0	3	3	5	13	6	3	5	2
ROME	12,045	8	8.00	1	12.5	0	0	0	0	0	0	0	0	0	0	1	125.00	0	1	0	1	0	0	1	1	1	1	1
Boonville	4,000	2	6.00	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	1	0	0	0	0	0	0	0	0	0
Camden	3,400	4	14.12	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	2	0
Waterford	4,328	9	24.95	5	55.5	0	0	0	0	0	0	0	0	0	1	2	333.33	0	1	0	1	0	0	2	0	1	0	1
Milton	5,565	12	25.87	1	8.3	0	0	1	0	0	0	0	0	0	0	0	83.33	0	3	0	2	0	2	0	0	0	3	1

a A large transient population. *b* Deaths in Mt. Vernon Home not included. *c* Not including Plattsburgh village.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST:																												
Saratoga Springs	*10,000	16	19.20	3	18.8	0	0	0	0	0	0	0	0	0	3	1	250.00	0	4	0	2	1	0	2	1	1	0	1
Mechanicville	*2,500	5	24.00	2	40.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	2	0	0	0	0	2	0	0	0	0
Rest of district	....	52	....	9	17.3	0	0	0	0	0	0	0	1	0	1	6	152.70	3	5	2	4	1	5	8	1	1	10	4
SOUTHERN TIER DIST:																												
Totals	....	134	....	43	32.1	1	...	1	1	...	1	3	...	1	3	23	253.73	14	10	4	10	4	6	14	3	13	10	12
BINGHAMTON	*20,000	37	22.20	16	43.2	0	0	1	0	0	0	1	0	0	1	14	459.45	3	3	0	3	0	3	4	0	2	1	1
ELMIRA	*25,000	25	12.00	11	44.0	0	0	0	1	0	0	1	0	0	1	4	280.00	5	3	1	2	0	0	3	0	1	1	2
Hornellsville	*10,000	7	8.40	1	14.3	0	0	0	0	0	0	0	0	0	0	2	285.71	0	0	0	0	0	0	0	1	1	2	1
Bath	7,400	7	11.35	1	14.3	1	0	0	0	0	0	0	0	0	0	0	142.85	0	0	1	0	1	0	0	1	0	2	1
Olean	*8,000	10	15.00	2	20.0	0	0	0	0	0	1	0	0	0	0	2	300.00	1	1	0	1	0	0	1	0	1	1	1
Jamestown	*12,000	12	12.00	3	25.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	1	3	1	0	1	0	2	0	0
Westfield	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	1	0	0	0
Fredonia	28,000	5	21.43	2	40.0	0	0	0	0	0	0	1	0	0	0	1	400.00	0	0	0	0	0	1	0	0	0	0	2
Rest of district	....	29	....	7	24.1	0	0	0	0	0	0	0	0	1	1	0	68.96	3	1	1	1	2	1	5	0	6	3	4
EAST CENT. DIST: Totals	....	181	....	52	28.7	2	...	7	2	...	...	...	...	1	...	20	176.80	5	24	...	15	4	18	23	8	13	13	26
Franklin	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1	0	0	0	0
Delhi	3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	1
Walton	3,541	5	16.91	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	2	0	0	0	0	2	0	0
Cooperstown	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	1	1000.00	0	0	0	0	0	0	0	0	0	0	0
Oneonta	*5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	1	0	0	1
Worcester	*3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	1
Brookfield	3,685	3	9.77	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	1	0	0	1	0	0	0	0	0	0	0
Baldwinsville	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	1	0	0
SYRACUSE	*65,000	71	13.11	29	40.9	2	0	1	2	0	0	0	0	0	0	11	225.35	3	12	0	6	2	3	6	2	6	2	13
Geddes	7,000	6	10.29	4	66.6	0	0	0	0	0	0	0	0	0	0	3	500.00	1	0	0	0	0	0	1	0	0	1	0
Cortland	....	6	....	1	16.7	0	0	1	0	0	0	0	0	0	0	1	333.34	0	1	0	0	0	2	1	0	0	0	0
Homer	3,500	3	10.03	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	1	0	0	1
Rest of district	....	77	....	11	14.3	0	0	5	0	0	0	0	0	1	0	3	116.75	0	10	0	6	2	11	12	4	4	10	9
WEST CENTRAL DIST:																												
Totals	....	127	....	19	15.0	1	...	1	1	...	...	..	...	...	2	10	118.11	1	25	1	10	9	12	14	3	11	16	10
AUBURN	*26,000	28	12.92	6	21.4	1	0	0	0	0	0	0	0	0	0	6	250.00	0	2	0	2	2	5	4	2	1	2	1

Ithaca	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	1	0	0	1	1	1
Seneca Falls	6,853	7	12.26	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	[illegible]	[illegible]	[illegible]	[illegible]	0	1	0	0	1	0	0
Manchester	*4,000	1	3.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	[illegible]	[illegible]	[illegible]	0	0	0	1	0	0	0	0
Phelps	*7,000	5	8.50	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	2	1	1	0	0	0	0	0
Canandaigua	6,300	10	19.05	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	2	0	4	1	1
Lima	*2,800	6	25.72	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	3	0	0	0	0	2	0	0	1	0
Le Roy	*3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	2	3	0
Rest of district	....	58	....	7	12.1	0	0	1	1	0	0	0	0	0	2	3	120.70	0	14	0	5	5	4	5	1	2	8	7
LAKE ONTARIO & WESTERN DIST: Totals...	....	627	....	270	43.1	7	...	4	3	...	8	9	...	4	33	91	253.59	22	65	16	34	14	36	102	18	39	31	91
OSWEGO	*24,000	23	11.42	6	26.1	0	0	1	0	0	0	0	0	0	0	0	43.46	2	3	0	0	3	2	8	1	0	0	3
Fulton	*4,000	2	6.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	1	0
Lyons	....	2	....	0	....	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	1	0	0	0	0
Arcadia	5,700	9	18.91	1	11.1	0	0	0	0	0	0	0	0	0	0	1	111.11	0	4	0	0	0	1	1	0	0	2	0
Sodus	5,285	3	6.80	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	0	0	0	1
Wolcott	3,753	3	9.60	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	0	0	1	0	0
ROCHESTER	*101,000	166	19.72	76	45.7	0	0	1	0	0	0	0	0	0	12	34	283.14	5	20	5	8	4	12	22	10	9	4	20
Brockport	*4,500	6	11.25	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	3	0	1	1	0
Mendon	3,200	3	11.25	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	1	1
Brighton	3,736	a2	7.50	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	1	0
Albion	5,147	3	7.16	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	2	0	0	0	0
LOCKPORT	*16,000	b6	4.50	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	1	0	3
Niagara	7,500	11	17.60	5	45.5	0	0	0	0	0	2	0	0	2	0	0	363.36	0	0	1	1	0	1	0	0	2	0	2
BUFFALO	*205,000	c280	17.80	154	55.0	7	0	1	1	0	2	9	0	2	15	50	....	13	22	2	16	3	15	48	2	17	5	50
Tonawanda	4,900	6	14.70	4	66.7	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	1	1	0	1	0	0	0	0	2
Amherst	*4,518	3	8.00	2	66.7	0	0	0	0	0	0	0	0	0	2	0	666.67	0	1	0	0	0	0	0	0	0	0	0
Aurora	*3,000	4	12.67	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	0	1	2	0	0	0	0
Hamburg	3,235	8	29.65	2	25.0	0	0	0	0	0	4	0	0	0	0	0	500.00	0	0	0	1	0	0	2	0	0	1	0
Rest of district	....	87	....	16	18.4	0	0	1	2	0	0	0	0	0	4	5	137.93	0	10	6	6	4	1	13	4	7	15	9
Totals for the State.	....	9,318	....	5,066	54.4	41	2	61	89	4	89	97	14	77	284	2983	401.37	464	883	107	612	318	392	1052	172	375	413	759

a Eight deaths in public institutions. *b* Returns very incomplete. *c* For four weeks ending July 25.

REMARKS.—The total reported mortality is 9,318; the percentage of infant mortality is 54.4. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 401.37. From diarrhœal diseases, the number of deaths from which in June was five times that of May, and is in July nearly as much greater than that of June, the ratio per 1,000 to the total mortality is 320.00; they constitute about 75 per cent of the zymotic mortality. The actual mortality from other zymotic diseases and from consumption is about the same as in June; from acute respiratory diseases it is about one-fourth less. With this issue the totals of mortality for each sanitary district may be found on its caption line. For the month of June 198 delayed returns have been received, of which 53 were under five years of age.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during August, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	....	4,781	....	2,420	......	14	1	49	79	...	40	22	14	112	165	1157	326.92	337	602	31	277	213	199	388	99	161	218	607
NEW YORK CITY	*1,397,395	2,991	25.68	1,477	49.3	12	1	32	41	0	16	17	8	82	117	675	334.67	215	413	16	176	147	124	240	60	111	163	325
BROOKLYN	*665,602	1,370	24.70	719	52.5	0	0	13	31	0	24	4	5	24	39	342	352.55	100	142	12	81	54	54	111	30	37	32	235
Gravesend	a*9,000	19	23.11	15	79.0	0	0	0	0	0	0	0	0	0	2	11	684.21	2	0	0	1	0	0	1	1	1	0	0
New Lots	*19,000	48	30.32	28	58.32	0	0	0	1	0	0	0	0	2	0	14	354.16	3	9	1	3	2	0	5	0	2	3	3
New Utrecht	4,742	17	43.02	5	29.4	0	0	1	0	0	0	0	0	0	0	2	176.47	0	2	0	1	0	1	4	0	2	0	4
Flatlands	3,127	8	30.70	6	75.0	0	0	0	0	0	0	0	0	0	0	2	250.00	0	1	1	0	0	0	2	0	0	0	2
Newtown	*10,000	31	37.20	16	51.6	0	0	0	2	0	0	0	0	0	0	10	387.10	2	6	0	0	1	1	3	0	0	2	4
Oyster Bay	*12,000	19	19.00	9	47.3	0	0	0	1	0	0	0	0	0	0	6	368.42	0	1	0	1	0	2	4	1	0	2	1
Hempstead	18,160	51	33.70	26	51.0	0	0	0	0	0	0	0	0	0	4	24	549.02	1	7	0	2	1	2	2	0	1	5	2
North Hempstead	7,000	12	20.57	7	58.3	0	0	0	0	0	0	0	0	0	0	6	500.00	0	0	0	0	1	0	2	1	1	1	0
Jamaica	10,089	6	7.13	5	83.3	0	0	0	0	0	0	0	0	0	0	3	500.00	0	1	0	0	0	0	1	0	0	0	1
Babylon	4,739	b4	10.12	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	1	0	0	0	1
Southold	7,267	14	23.11	5	35.7	0	0	0	0	0	0	0	0	0	0	4	285.71	1	1	0	3	0	1	1	0	1	1	1
Southampton	6,352	11	20.78	5	45.5	0	0	0	0	0	0	0	0	0	0	3	272.72	1	0	0	1	0	1	1	1	1	1	1
Northfield	7,014	11	18.81	6	54.5	0	0	0	1	0	0	0	0	0	0	4	545.45	0	0	0	0	1	1	0	1	1	0	2
Westfield	5,289	19	43.10	13	68.1	0	0	1	0	0	0	1	1	1	0	7	578.68	4	0	0	1	0	1	0	0	0	1	1
YONKERS	*22,000	54	29.45	29	53.7	1	0	1	2	0	0	0	1	0	2	19	481.48	3	7	1	3	1	4	3	1	0	2	3
Westchester	*6,900	10	17.39	4	40.0	1	0	0	0	0	0	0	0	0	1	0	300.00	0	1	0	1	2	1	0	0	1	0	2
Mount Vernon	*5,000	12	28.80	7	58.4	0	0	1	0	0	0	0	0	0	0	5	500.00	0	0	0	0	1	0	1	1	0	2	1
Rye	*7,500	4	6.40	1	25.0	0	0	0	0	0	0	0	0	1	0	0	250.00	0	0	0	0	0	1	1	0	1	0	0
Sing Sing	*6,500	16	29.53	6	37.5	0	0	0	0	0	0	0	0	0	0	4	250.00	0	5	0	0	1	2	0	1	0	0	3
Rest of district	....	57	......	31	54.4	0	0	0	0	0	0	0	0	0	0	16	280.70	5	5	0	3	0	3	5	1	1	3	15
HUDSON VALLEY DIST.: Totals	....	855	....	371	......	12	...	25	13	...	7	3	...	5	48	196	357.90	30	101	4	57	36	30	84	26	38	48	95
ALBANY	*96,000	163	20.37	68	41.7	2	0	4	0	0	3	0	0	2	18	24	325.15	7	24	1	14	8	5	14	1	4	7	25
COHOES	*20,000	47	28.20	27	57.5	0	0	4	0	0	1	0	0	0	1	14	425.53	2	9	0	1	3	0	3	1	3	2	3
West Troy	*13,000	33	30.46	12	36.4	0	0	4	0	0	0	0	0	0	6	4	424.25	5	2	0	6	0	1	0	0	2	2	1
Hoosick Falls	*4,000	8	24.00	6	75.0	0	0	0	0	0	0	0	0	0	1	1	250.00	1	0	0	1	0	1	1	0	0	0	2
TROY	*60,000	99	19.80	35	35.3	4	0	1	0	0	0	0	0	0	2	21	282.32	3	[illegible]	0	7	[illegible]	9	6	7	10	1	[illegible]
Lansingburgh	8,500	20	28.23	6	30.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Green Island	*5,000	11	26.40	7	63.6	3	0	1	0	0	0	0	0		0	3	[illegible]	[illegible]	[illegible]	0	0	0	0	0	1		0	3
Greenbush	7,200	14	23.33	6	42.9	0	0	0	1	0	0	0	0	0	1	2	285.71	0	3	0	0	1	0	2	0	0	1	8
Catskill	*4,500	9	24.00	5	55.5	0	0	0	0	0	0	0	0	0	0		444.45	0	0	0	0	0	0	1	3	0	0	1
HUDSON	*10,000	29	34.80	17	58.6	0	0	0	0	0	0	0	0	0	4	6	344.83	0	3	0	2	0	1	4	1		0	7
KINGSTON	21,100	32	18.19	21	65.6	1	0	1	1	0	2	2	0	0	0	9	500.00	4	3	1	0	0	0	2	1		0	1
Wawarsing	8,547	6	8.42	3	50.0	0	0	1	0	0	1	0	0	0	0	1	500.00	0	0	0	1	0	0	1	0	0		0
Rosendale	5,000	5	12.00	3	60.0	0	0	0	2	0	0	0	0	0	0	0	400.00	0	0	0	3	0	0	0	0	0	0	0
Marbletown	4,000	5	15.00	3	60.0	0	0	0	1	0	0	0	0	0	0	3	800.00	0	0	0	0	0	0	0	0	0	1	0
Esopus	4,736	8	20.27	2	25.0	0	0	1	0	0	0	0	0	0	1	1	375.00	0	2	0	0	1	0	0		0	0	2
Saugerties	4,000	6	18.00	5	83.3	0	0	0	0	0	0	0	0	0	0	4	666.67	0	0	0	1	0	0	0		0	0	0
POUGHKEEPSIE	20,207	32	19.01	13	40.6	1	0	0	0	0	0	0	0	0	1	8	312.50	1	3	0	2	1		5	1	0	2	6
Fishkill	10,732	21	23.48	6	28.5	0	0	0	0	0	0	0	0	0	0	13	619.05	1	0	0	3	1	0	1	0	1	1	0
Wappinger's Falls	5,000	12	28.80	5	41.7	0	0	0	0	0	0	0	0	0	1	3	333.33	0	2	0	0	1		0	0	1	0	3
NEWBURGH	20,000	28	16.80	15	53.5	0	0	0	3	0	0	0	0	0	2	5	357.14	1	4	0	4	1		6	0	1	0	0
Port Jervis	9,000	15	20.00	7	46.7	0	0	0	0	0	0	0	0	0	0	4	266.66	0	1	1	0	1		0		1	1	5
Middletown	10,000	12	14.40	5	41.7	0	0	0	0	0	0	0	0	0	0	5	416.67	0	2	0	1	0		2		0	1	0
Goshen	4,387	12	32.82	7	58.3	0	0	1	0	0	0	0	0	1	1	2	416.67	2	1	0	0	0	0	1	0	0	2	1
Haverstraw	7,000	14	24.00	8	57.1	0	0	0	0	0	0	0	0	0	0		285.71	0	0	0	0	0	0	2	0	2	1	5
Orangetown	8,077	17	25.26	8	47.0	0	0	0	0	0	0	0	0	0	2		529.71	0	1	0	0	0	0	3	1	2	1	0
Ramapo	5,000	9	21.60	2	22.2	0	0	0	0	0	0	0	0	1	0		222.22	0	0	0	1	0	1	1	1	1	2	0
Rest of district	....	188	....	69	36.7	1	0	3	5	0	0	1	0		7	43	321.46	3	17	0	10	12		28	6		16	24
ADIRONDACK & NORTHERN DISTRICT: Totals	....	217	....	74	......	1	...	3	1	...	...	1	1		13	41	304.15	1	27	1	13	7	18	29	10	14	10	21
Argyle	3,700	3	9.73	0	....	0	0	1	0	0	0	0	0	0	0		666.67	0	0	0	0	0	0	0	0		0	1
Greenwich	3,861	3	9.50	2	66.6	0	0	0	0	0	0	0	0		0		666.67	0	0	0	0	0	0	0	0		0	1
Fort Ann	4,267	3	8.81	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	1	0	0	0
Fort Edward	4,680	8	13.67	3	37.5	0	0	0	0	0	0	0	0	1	0	2	375.00	0	0	0	1	0	0	0		2	0	1
Queensbury	10,000	20	24.00	10	50.0	0	0	0	0	0	0	0	0	0	0	8	400.00	0	4	0	0	0	0	5				1
Crown Point	4,287	6	16.80	5	83.3	0	0	0	0	0	0	0	0	0	1	3	666.67	0	0	0	1	0	0	1	0		0	0
Port Henry	2,525	3	14.25	2	66.7	0	0	0	0	0	0	0	0	0	0	6	....	0	0	0	0	1		0	0	0	0	1
Malone	7,908	12	18.23	3	25.0	0	0	0	0	0	0	0	0	0	1	2	250.00	0	1	1	0	1		1	0	3	1	1
OGDENSBURG	11,000	17	18.54	5	29.1	0	0	1	0	0	0	0	0	0	1	3	294.12	0	2	0	0	0			1	0		1
Gouverneur	5,000	11	24.20	5	45.5	1	0	0	0	0	0	0	0	0	3	2	545.45	0	0	0	0	0				0		2
Ellisburgh	4,812	6	14.96	0	......	0	0	0	0	0	0	0	0	0	1	0	166.67	0	2	0	1	0		2	0	0		0
WATERTOWN	13,000	10	9.23	1	10.0	0	0	0	0	0	0	0	0	0	1	0	100.00	0	1	0	1	0		2				1
Cape Vincent	3,143	1	3.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1		0	0	0	0
Rest of district	....	114	....	38	33.3	0	0	1	1	0	0	1	1	3	5	19	271.05	1	16	0	9	5	12	12		8	5	11
MOHAWK VALLEY DIST.: Totals	....	338	....	141	......	7	...	9	1	...	3	...	1	...	3	67	327.33	11	47	1	14		31	39	10		16	39
SCHENECTADY	*15,000	32	25.60	19	59.1	0	0	1	0	0	2	0	0	0	0	7	312.50	1	9	0	1	0	3	3	0	2	0	3
Schoharie	3,350	3	10.75	2	66.6	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	1	0	0	0	0
Middleburgh	3,376	2	7.13	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0		0			0	0	0
AMSTERDAM	13,000	25	23.08	14	56.0	0	0	1	0	0	0	0	0	0	0	8	360.00	0	3	0	2		1			1	2	0
Johnstown	*6,000	8	16.00	3	37.5	0	0	0	0	0	0	0	0	0	0	2	250.00	0	0	0	0		4			0	0	0
Gloversville	*8,000	11	15.12	5	45.5	0	0	0	0	0	1	0	0	0	0	2	375.01	0	0	0	1		1			1	1	2
Little Falls	7,300	8	13.15	4	50.0	0	0	0	0	0	0	0	0	0	0	4	500.00	0	1	0	0	0	0			0	0	1
Ilion	4,500	11	29.23	7	63.7	0	0	0	0	0	0	0	0		0	3	272.27	1	2	0	2	0	0		0	0	0	0
Herkimer	3,000	3	12.00	3	100.0	0	0	0	0	0	0	0	0	0	0	2	666.67	1	0	0	0	0	0		0	0	0	0
UTICA	39,000	80	24.61	32	40.0	7	0	3	0	0	0	0	0	0	1	23	425.00	2	11	0	1		6	11	2	1	0	11
ROME	12,045	18	18.00	4	22.2	0	0	0	0	0	0	0	0	0	0		222.22	1	4	0	0		1	0	2	1	1	3
Boonville	4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00[a]	2	1	0	0		0	0		0	0	0
Camden	3,400	3	10.58	0	......	0	0	0	0	0	0	0	1	0	0	0	333.33[b]	0	0	0	0		1	0			0	0

a Including transient population. *b* Besides 3 in public institutions.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhoeal diseases.
MOHAWK VALLEY DIST.:																
Waterford	4,328	11	30.50	3	27.2	0	0	0	0	0	0	0	0	0	0	3
Ballston Spa	*3,300	11	40.00	5	45.4	0	0	0	1	0	0	0	0	0	0	2
Saratoga Springs	10,000	33	39.60	9	32.7	0	0	0	0	0	0	0	0	0	1	9
Rest of district	....	74	....	29	40.3	0	0	4	0	0	0	0	0	0	1	16
SOUTHERN TIER DIST.:																
Totals	....	202	....	78	......	3	...	5	4	...	1	...	...	...	5	37
BINGHAMTON	*20,000	34	20.40	17	50.0	0	0	0	1	0	0	0	0	0	0	7
Owego	*6,000	9	18.00	5	55.5	0	0	0	0	0	0	0	0	0	0	3
Candor	4,323	5	13.88	0	......	0	0	0	0	0	0	0	0	0	0	0
ELMIRA	*25,000	46	17.28	14	36.1	0	0	0	2	0	0	0	0	0	0	7
Horseheads	3,500	2	6.45	0	......	0	0	0	0	0	0	0	0	0	0	0
Bath	7,400	17	27.57	4	23.5	0	0	0	0	0	0	0	0	0	1	3
Olean	8,000	11	15.12	8	72.7	0	0	0	0	0	0	0	0	0	1	5
Jamestown	12,000	25	25.00	8	32.0	2	0	0	0	0	0	0	0	0	0	2
Westfield	3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1
Fredonia	2,800	4	17.10	0	......	0	0	1	0	0	0	0	0	0	0	0
Rest of district	....	56	....	21	37.5	1	0	4	1	0	1	0	0	0	3	9
EAST CENTRAL DIST.:																
Totals	....	271	....	102	......	4	...	4	2	...	2	...	1	1	3	67
Franklin	3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	1
Delhi	3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0
Walton	3,541	2	6.85	1	50.0	0	0	0	0	0	0	0	0	0	0	0
Cooperstown	*3,000	6	24.00	2	33.3	1	0	0	0	0	0	0	0	0	0	1
Oneonta	*5,000	11	26.40	7	63.7	0	0	0	0	0	0	0	0	0	0	5
Worcester	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0
Cazenovia	4,363	4	11.50	0	......	0	0	0	0	0	0	0	0	0	0	1
Oneida	....	6	....	0	......	0	0	0	0	0	0	0	0	0	0	0
Baldwinsville	3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1
SYRACUSE	65,000	117	21.60	63	53.8	1	0	0	1	0	1	0	1	0	1	40
Geddes	7,000	12	20.57	6	50.0	0	0	0	1	0	1	0	0	0	0	4
Cortland	7,361	5	8.15	2	40.0	0	0	1	0	0	0	0	0	0	0	1
Homer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rest of district	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhoeal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST.:												
Waterford	272.72	2	1	0	0	0	2	0	0	0	2	1
Ballston Spa	272.72	0	0	1	0	0	0	3	0	1	2	1
Saratoga Springs	303.03	0	7	0	4	2	4	0	1	1	2	2
Rest of district	277.78	0	7	0	3	2	8	8	2	2	6	15
SOUTHERN TIER DIST.:												
Totals	272.77	7	22	1	23	5	13	29	9	10	11	17
BINGHAMTON	335.30	1	2	0	5	0	2	9	1	1	1	4
Owego	333.33	0	2	0	0	0	0	0	0	2	1	1
Candor	....	0	2	0	1	1	0	0	0	0	0	1
ELMIRA	250.00	1	5	0	3	1	3	7	5	2	0	0
Horseheads	....	0	1	0	0	0	0	0	0	0	1	0
Bath	235.30	0	1	0	2	1	1	3	2	0	0	3
Olean	545.45	1	1	0	0	0	0	1	0	1	1	0
Jamestown	160.00	1	2	0	9	0	2	2	0	1	2	2
Westfield	333.33	0	1	1	0	0	0	0	0	0	0	0
Fredonia	250.00	1	0	0	0	0	0	0	0	0	2	0
Rest of district	329.21	2	5	0	3	2	5	7	1	3	3	6
EAST CENTRAL DIST.:												
Totals	311.11	12	28	4	11	12	20	27	10	9	16	38
Franklin	1000	0	0	0	0	0	0	0	0	0	0	0
Delhi	....	0	1	0	0	0	0	0	0	0	0	1
Walton	....	0	0	0	2	0	0	0	0	0	0	0
Cooperstown	333.33	2	1	0	0	1	0	0	0	0	0	0
Oneonta	454.55	1	1	0	0	1	0	1	1	0	0	1
Worcester	....	0	1	0	0	0	0	0	1	0	0	0
Cazenovia	250.00	0	2	0	0	0	0	0	0	0	1	0
Oneida	....	0	1	0	0	0	0	1	0	0	1	3
Baldwinsville	333.33	0	0	0	1	0	1	0	0	0	0	0
SYRACUSE	384.61	1	11	2	5	4	4	11	4	6	5	19
Geddes	500.00	0	1	0	0	0	1	1	0	0	1	2
Cortland	400.00	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Homer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rest of district	222.23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

WEST CENTRAL DIST.:																												
Totals	....	172	....	39	....		...	3	2	...	...	1	1	...	3	34	261.08	5	19	3	7	13	12	24	8	8	19	9
AUBURN	*26,000	47	21.70	17	36.2	0	0	0	0	0	0	1	1	0	2	15	442.55	3	6	1	1	1	2	8	3	1	0	3
Ithaca	10,000	12	14.40	4	33.3	0	0	0	0	0	0	0	0	0	0	6	500.00	0	1	0	1	0	1	3	0	0	0	0
Waterloo	*4,500	7	18.66	1	14.3		0	1	0	0	0	0	0	0	0	1	285.71	0	2	1	0	0	0	0	0	0	2	0
Seneca Falls	6,853	11	19.26	4	36.4		0	0	0	0	0	0	0	0	0	2	272.71	0	1	0	1	1	1	1	0	0	2	1
Manchester	*4,000	1	3.00	1	100.0		0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Phelps	*7,000	5	8.57	0	.....	0	0	1	0	0	0	0	0	0	0	1	400.00	0	0	1	0	0	0	0	1	1	0	0
Geneva	*6,000	9	18.00	1	11.1	0	0	0		0	0	0	0	0	0	1	111.11	0	1	0	1	1	1	1	0	1	1	1
Attica	3,100	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	2	666.66	0	0	0	0	0	1	0	0	0	0	0
Penn Yan	*4,500	6	16.00	0	......	0	0	0		0	0	0	0	0	0	0	....	0	1	0	1	1	0	0	0	0	2	1
Lima	*2,800	1	4.28	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	70	....	10	14.3	0	0	1		0	0	0	0	0	1	6	142.85	2	7	0	2	9	7	10	4	5	11	3
LAKE ONTARIO & WESTERN DIST.: Totals	....	445	....	180	.....		...	9		...	4	1	...	...	20	100	307.00	16	49	9	28	13	24	55	20	16	28	49
OSWEGO	*21,000	28	11.00	12	42.8	0	0	0		0	0	0	0	0	0	8	285.72	0	5	0	2	0	2	5	2	2	0	2
Lyons	4,500	19	50.66	4	21.1		0	0	0	0	0	0	0	0	1	3	210.53	0	1	0	3	0	3	3	2	2	1	0
Newark	*3,500	4	13.74	2	50.0	0	0	0	0	0	0	0	0	0	0	2	500.00	0	1	0	0	0	0	0	0	0	1	0
Palmyra	*4,800	6	15.00	1	16.6	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	1	0	2	1
Wolcott	3,753	1	3.19	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
ROCHESTER	*101,000	204	24.23	99	48.5	0	0	2	0	0	0	0	0	0	9	48	284.36	12	28	4	11	6	10	27	8	7	6	28
Brockport	4,500	7	18.66	3	42.7	0	0	0	1	0	0	0	0	0	0	4	714.28	0	1	0	0	0	1	0	0	0	0	0
Greece	*5,000	5	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	1	1	0	1	0	0
Mendon	3,200	3	11.25	2	66.6		0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	2
Brighton	3,736	a8	25.69	3	37.5		0	0	0	0	0	1	0	0	0	2	275.00	0	2	1	0	0	0	0	0	1	1	0
LOCKPORT	16,000	9	6.75	5	55.5		0	0	0	0	0	0	0	0	0	4	444.45	0	1	0	1	2	0	1	0	0	0	0
Tonawanda	4,900	13	31.83	7	54.0		0	0	0	0	0	0	0	0	0	7	540.00	1	0	0	0	0	1	1	0	0	2	1
Amherst	4,518	4	10.62	2	50.0	0	0	1	0	0	0	0	0	0	1	1	750.00	0	0	0	0	0	0	1	0	0	0	0
Hamburg	3,235	3	11.13	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	1	0	0	0	0	0	0	0	0	1
Aurora	3,000	6	24.00	4	33.3		0	0	0	0	0	0	0	0	0	4	333.33	0	1	0	0	0	0	0	1	0	0	0
Rest of district	....	125	....	35	28.5		0	6	0	0	4	0	0	0	9	18	300.81	3	7	4	11	4	6	16	6	3	13	14
Totals for the State	....	7,284	....	3,405	46.7	43	1	104	103	...	57	28	19	123	260	1719	337.31	419	895	54	430	307	347	675	192	267	366	875

REMARKS.— The total reported mortality for the month is 7,284, being considerable less than for July. This is partly accounted for by the failure of Buffalo and Long Island City and several large villages to make reports. The percentage of infant mortality is 46.73; in July it was 54.4, and in June 40.0 per cent. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 337.31; that from diarrhœal diseases being 236.00, or about 70 per cent of the total zymotic mortality. From consumption the ratio per 1000 is 128.87 (the lowest for the year), and from acute respiratory diseases, 57.52. For the month of July 450 delayed returns have been received, of which 85 were under five years of age.

a Also 12 deaths in public institutions.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during September, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	....	4,112	....	1,708	41.6	18	...	69	89	5	23	7	7	77	203	591	....	354	611	34	257	248	195	363	85	175	222	479
NEW YORK CITY	*1,397,395	2,647	22.73	1,163	44.0	17	0	49	41	5	4	5	4	56	135	384	264.45	238	415	25	166	177	127	222	56	100	174	247
BROOKLYN	*665,602	1,126	20.30	521	46.2	0	0	14	34	0	17	0	2	17	55	163	270.00	95	158	6	73	54	52	102	21	45	30	186
Gravesend	*7,000	12	20.57	6	50.0	0	0	0	3	0	0	0	0	0	1	4	666.67	0	0	0	0	0	0	1	0	3	0	0
New Lots	*19,000	45	28.42	24	53.3	0	0	0	2	0	0	0	0	1	2	6	244.42	1	6	0	2	0	2	11	0	1	4	7
New Utrecht	4,742	13	26.91	6	46.1	0	0	0	0	0	0	0	0	0	1	1	153.85	0	0	0	1	0	0	1	0	4	1	4
Flatlands	3,127	7	26.85	2	28.6	0	0	0	0	0	0	0	0	0	1	5	857.15	0	0	0	0	0	0	0	1	0	0	0
Newtown	*10,000	26	31.20	12	16.1	0	0	1	1	0	1	0	0	1	1	3	444.44	2	5	0	1	0	0	1	0	0	1	7
Oyster Bay	*12,000	13	13.00	2	15.4	0	0	0	0	0	0	0	0	0	0	0	....	1	3	0	0	1	1	1	1	3	1	1
Hempstead	18,160	12	8.00	5	43.4	0	0	1	0	0	0	0	1	1	0	2	434.34	2	2	0	1	1	0	0	0	0	0	1
North Hempstead	8,000	11	16.50	3	27.3	0	0	0	1	0	0	0	0	0	0	1	181.82	1	0	1	1	0	2	2	0	0	2	0
Babylon	4,739	4	10.00	0	...	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	1	0	0	0	1
Southold	7,267	14	20.01	3	21.4	0	0	0	0	0	0	0	0	0	0	1	100.00	0	2	2	1	0	0	0	0	2	1	5
Southampton	6,352	7	13.23	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	2	0	1	0	0	0	0
Edgewater	*10,000	14	16.80	7	50.0	0	0	0	1	0	1	0	0	0	1	1	285.71	2	3	0	0	1	0	2	0	0	0	2
Northfield	7,014	11	18.86	3	27.3	0	0	1	1	0	0	0	0	0	0	0	181.82	0	1	0	1	0	1	2	1	1	1	1
Westfield	5,289	15	33.96	6	40.0	0	0	0	1	0	0	2	0	0	1	1	333.33	3	1	0	3	0	0	1	0	2	0	0
YONKERS	*22,000	31	16.91	13	42.0	0	0	0	0	0	0	0	0	1	0	7	258.06	3	2	0	1	5	2	4	0	3	0	3
Westchester	*6,900	10	17.40	6	60.0	1	0	0	0	0	0	0	0	0	2	1	400.00	1	1	0	0	1	0	1	1	0	0	1
Mount Vernon	*5,000	9	21.60	4	44.5	0	0	0	0	0	0	0	0	0	0	2	222.22	0	0	0	2	0	2	0	0	1	0	2
Rye	3,500	5	17.15	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	2	0	1	1	0	0	0	0
Sing Sing	*6,500	13	24.00	4	30.7	0	0	0	0	0	0	0	0	0	0	2	153.80	0	0	0	0	1	1	2	0	0	4	3
Rest of district	....	68	....	15	23.8	0	0	3	4	0	0	0	0	0	3	5	....	2	9	0	2	4	4	7	4	10	3	8
HUD. VAL. DIST.: Totals	....	735	....	229	31.2	9	...	26	8	...	6	1	2	8	65	81	....	38	102	13	47	28	52	93	11	31	61	53
ALBANY	*96,000	180	22.50	65	36.1	0	0	7	0	0	1	0	0	2	34	11	305.55	4	31	2	15	6	15	23	1	8	6	14
COHOES	*20,000	12	7.20	4	33.3	0	0	1	1	0	1	0	0	0	0	2	416.67	1	1	0	1	1	0	0	0	0	2	1
West Troy	*13,000	26	23.85	8	30.8	0	0	1	0	0	0	0	0	0	2	6	246.15	1	1	0	1	2	1	4	0	1	2	1
Hoosick Falls	*4,000	12	36.00	4	33.3	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	3	0	250.00	1	1	0	0	0	2	2	0	0	3	0
[illegible]	*60,000	107	[illegible]	42	30.1	8	0	6	0	0	0	0	1	1	1	23	373.83	11	17	5	2	2	6	10	2	3	6	3
[illegible]	8,500	15	21.17	6	40.0	0	0	0	0	0	1	0	0	0	0	3	266.67	0	2	1	0	1	2	1	0	1	1	2

KINGSTON	21,100	28	15.92	14	50.0	0	0	0	1	0		1	0	0		1	357.14		[illegible]				[illegible]	[illegible]				0
Wawarsing	8,547	8	11.23	0	......	0	0	1	0	0		0	0	0	0	1	125.00		0			0	3	0	0	0		0
Rosendale	5,000	8	7.20	2	66.6	0	0	0	0	0	0	0	0	0	0	0	....		0	0	0	0	1	2	0	0		0
Marbletown	4,000	3	9.00	0	....	0	0	0	1	0	1	0	0	0	0	0	666.67	0	0	0	0	0	0	0	0	0	1	0
Esopus	4,736	7	18.00	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0		0	0	2	0	0	2	1
Saugerties	4,000	4	12.00	2	50.0	0	0	0	0	0	0	0	0	0	0	1	250.00	0	1	0	0	0	0	0	0	0	1	1
POUGHKEEPSIE	20,200	23	13.66	4	17.4	0	0	0	1	0	0	0	0	0	0	1	87.00	1	5	0	2	2	2	3	0	1	2	3
Fishkill	10,732	14	11.50	3	20.0	0	0	0	0	0	0	0	0	0	4	1	357.15	1	2	0	2	0	0	0	0		0	3
Wappinger's Falls	5,000	5	12.00	0	......	0	0	0	1	0	0	0	0	0		0	200.00	0	2	0	0	0	2	0	0	0	0	0
NEWBURGH	20,000	25	15.00	5	20.0	0	0	0	2	0	0	0	0	0		0	200.00		3	0		1	2	4	0	2	0	2
Port Jervis	9,000	8	10.66	2	25.0	0	0	1	0	0	0	0	0	0		0	125.00	2	1	0	2	0	0	0	0	0	1	1
Middletown	10,000	15	18.00	2	13.3	0	0	3	0	0	0	0	0	0	0	0	200 00	0	2	0	1	2	0	2	0	0	3	2
Goshen	4,387	9	24.54	4	44.5	0	0	1	0	0	0	0	0	1	1	0	333.33		1	0	1	0	0	1	0	0	1	2
Haverstraw	7,000	17	29.14	9	53.0	0	0	0	0	0	0	0	0	1	0		352.94	0	2	0	0		0	2	1	2	2	1
Ramapo	5,000	2	4.80	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	167	....	37	22.5	1	0	3	1	0	1			3	9	21	... .	8	23	2	12	5	8	21	5	8	22	12
ADIRONDACK & NORTHERN DIST.: Totals.	....	218	....	64	30.0	2	...	15	2					3		21	....	8	25	4	21		19	24		6	18	23
Argyle	3,700	4	13.00	0	.....	0	0	0	0	0	0	0		0	0	0	....	0	1	0	0	0	1	1	0	0	1	0
Greenwich	3,861	5	15.55	0	......	0	0	0	0	0	0	0		0	0	0	....	0	2	0		0	1	1		0	0	1
Fort Ann	4,267	4	11.25	2	50.0	0	0	0	0		0			0	0	0	....	0	0	1	2		0	0		0	0	1
Fort Edward	4,680	5	12.29	2	40.0	0	0	0	0		0			0	0	0	....	0	0	0			0	0	0	1	0	1
Queensbury	10,000	13	15.60	3	23.1	0	0	0	0	0	0	0		0	0	1	76.92		3	0			2	3	2	0	1	0
Port Henry	2,525	4	19.00	4	100.0	0	0	0	0	0	0	0		0	0	2	500.00	0	0	0	1		0	0	0		0	1
Malone	7,908	17	25.00	11	64.7	0	0	2	0	0	2	0		0	6		666.66		0	0	0		0	1	0		2	2
OGDENSBURG	11,000	13	14.18	3	23.1	0	0	0	0	0	0	0			0		230.07	0					1	0	0	0	0	1
Gouverneur	5,000	12	28.80	7	58.3	0	0	1	0	0	0	0	0		2		583.33	0		0			0	0	0	0		0
Ellisburgh	4,812	2	5.00	0	......		0	0	0	0	0	0	0		0	0	....	0		1	0		0	0	0	0		0
Plattsburgh	*7,000	6	....	1	16.6		0	1	0	0	0	0	0			0	166.67	0		0	1	0	0	1	0	0		0
WATERTOWN	*12,269	16	15.13	5	31.3		0	1	1	0	0	0	0		0	0	125.00			0	1	1	2	2	0		0	2
Cape Vincent	3,143	5	19.10	0	......		0	1	0	0	0	0			0	0	200.00			0	0	0	2	0	0		0	0
Rest of district	....	112	....	26	23.2		0	9	1	0	0	0				12	....	2	9		9	2	10	15	4		12	14
MOHAWK VALLEY DIST.: Totals	....	235	....	69	29.3		...	6	2	...		...	...			27	....	17	33	6	21	5	16	37	7	15	17	16
SCHENECTADY	15,000	24	18.67	10	41.6	0	0	0	0	0	0	0	0	0		1	125.00	1	3		1	0	2	5	1	3	3	1
Middleburgh	3,376	4	14.23	1	25.0	0	0	0	0		0	0	0	0		0	....		1		0	0	1	0	0	0	0	0
AMSTERDAM	13,000	18	16.15	8	44.4	0	0	2	0	0	0	0	0	0		3	333.33		2	0	4	0	0	2	0	2	1	1
Johnstown	*6,000	9	18.00	2	22.2	0	0	0	0	0	0	0	0	0	0		222.22	2	1	2	1	0	0	1	0	0	0	0
Gloversville	*8,000	9	13.50	4	44.4	0	0	1	0	0	0	0	0	0	0		222.22	0	0	0	0	0	0	4	0	2	0	1
Little Falls	7,300	8	13.15	1	12.5	0	0	0	0		0	0	0	0	1	0	125.00	0	1	0	1	1	0	1	1	1		0
Ilion	4,200	7	20.00	3	42.8	0	0	1	1			0	0	1	0	1	585.85	1	1	0	0	0	0	0	0	0		0
Herkimer	3,000	2	8.00	0	......	0	0	0	0			0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	1	0	0
UTICA	*39,000	42	12.80	8	19.0	0	0	0	0		0	0	0	0	2	4	142.86	2	9	1	2	1	4	9	3	2	2	1
ROME	12,045	20	20.00	7	35.0	0	0	0	0		0	0	0	0	0	6	300.00	1	1	0	0	0	1	7	0	0	3	1
Boonville	4,000	2	6.00	0	......	0	0	0	0		0	0	0	0	0	0	....	0		0		0	0	1	0	0	0	0
Camden	3,400	3	10.59	0	......	0	0	0	0		0	0	0	0	0	0	....	0		0		0	1	0		0	1	0
Waterford	4,326	6	16.64	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	0		0		1	0	0		0	0	0
Ballston Spa	3,300	7	25.45	2	28.6	0	0	0	1	0	0		0	0	0	1	285.71	0		0		0	1	1	0		0	1
Saratoga Springs	10,000	20	24.00	5	25.0	0	0	1	0	0	0		0	1	0	1	150.00	4	3	0	3	0	2	2	1	0	0	2
Rest of district	....	54	....	14	26.0	0	0	1	0	0	0		0	1	1	5	....	4	7	2	5	2	4	4	1	4		8

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
Totals	....	142	....	31	22.1	...	...	7	1	...	1	...	...	4	1	13	....	10	13	...	10	2	11	24	5	11	12	17
BINGHAMTON	*20,000	16	9.60	1	6.2	0	0	0	1	0	0	0	0	1	0	0	125.00	1	2	0	0	0	2	1	1	2	2	3
Candor	4,323	3	8.33	1	33.3	0	0	1	0	0	0	0	0	0	0	1	666.66	0	0	0	0	0	0	0	1	0	0	0
ELMIRA	25,000	24	11.52	9	37.5	0	0	1	0	0	0	0	0	0	1	1	125.00	2	1	0	5	1	1	3	2	3	0	3
Horseheads	3,500	3	10.29	1	33.3	0	0	1	0	0	0	0	0	0	0	1	666.66	0	1	0	0	0	0	0	0	0	0	0
Hornellsville	*10,000	11	13.20	2	18.2	0	0	2	0	0	0	0	0	0	0	2	363.63	0	1	0	0	0	2	0	0	0	2	2
Bath	7,600	10	16.22	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	2	0	0	4	1
Olean	8,000	9	13.50	6	66.6	0	0	0	0	0	1	0	0	2	0	1	444.44	1	0	0	1	0	0	0	0	1	0	2
Jamestown	12,000	10	10.00	2	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	3	0	4	0	0
Fredonia	2,800	2	8.57	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	1	0	0	0	0
Rest of district	....	54	....	8	14.3	0	0	2	0	0	0	0	0	1	0	6	....	4	7	0	2	1	5	14	1	1	4	6
EAST CENTRAL DIST.:																												
Totals	....	218	....	61	28.0	3	...	4	5	..	1	1	...	2	...	34	....	12	29	...	17	6	21	21	2	12	20	28
Franklin	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	0
Hancock	3,238	2	7.20	1	50.0	0	0	0	0	0	0	1	0	0	0	0	500.00	0	0	0	1	0	0	0	0	0	0	0
Walton	3,541	7	23.43	1	14.3	0	0	0	0	0	0	0	0	0	0	1	142.86	1	0	0	0	0	1	2	1	1	0	0
Delhi	3,000	7	28.00	3	42.6	0	0	0	0	0	0	0	0	1	0	2	....	0	0	0	1	0	1	0	0	0	2	0
Otsego	4,700	3	7.66	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	2	0
Oneonta	*5,000	8	19.20	3	42.9	0	0	0	0	0	0	0	0	0	0	3	428.57	0	0	0	1	0	0	2	0	0	0	2
Oneida	*5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	2	0	0	0	0	0
Canastota	2,500	2	9.60	0	......	0	0	0	1	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	1	0
Baldwinsville	3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	1
SYRACUSE	65,000	93	17.17	26	28.0	2	0	1	2	0	0	0	0	0	0	12	182.80	3	16	0	5	2	6	10	1	8	8	23
Geddes	7,000	4	6.86	0	......	0	0	0	2	0	0	0	0	0	0	0	500.00	0	2	0	0	0	0	0	0	0	0	0
Cortland	7,361	9	14.60	4	44.4	0	0	0	0	0	0	0	0	0	0	3	333.33	1	0	0	0	0	3	1	0	0	1	0
Homer	3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	1	0	0	2	0
Rest of district	....	71	....	22	31.0	1	0	3	0	0	1	0	0	1	0	13	....	4	9	0	7	4	8	5	0	3	10	2
WEST CENTRAL DIST.:																												
Totals	....	128	....	27	21.1	1	..	4	1	...	...	...	...	1	2	15	....	8	20	...	10	4	12	26	4	2	7	11
AUBURN	*26,000	26	12.00	5	19.2	1	0	0	0	0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	7	6	0	2	0	2	4	2	1	1	1
Ithaca	10,000	3	3.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Waterloo	[illegible]	5	13.33	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	2	0	0	0	1

Canandaigua	6,300	1	2.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	0
Geneva	*6,000	8	21.00	1	12.5	0	0	0	1	0	0	0	0	0	0	0	142.85	0	0	0	2	0	3	2	0	0	0	0
Le Roy	3,000	6	24.00	1	16.6	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	2	0	0	1	0	0	1	0
Rest of district	....	54	....	8	14.8	0	0	2	0	0	0	0	0	1	0	6	....	4	7	0	2	1	5	14	1	1	4	6
LAKE ONTARIO & WESTERN DIST.: Totals.	....	463	....	120	25.9	2	...	14	2	...	6	1	1	...	24	57	....	28	53	2	29	18	32	63	17	19	41	54
OSWEGO	*24,000	24	12.00	12	50.0	0	0	0	0	0	0	0	0	0	0	6	250.00	0	3	0	1	1	1	5	0	1	2	4
Fulton	4,000	8	24.00	0	......	0	0	1	0	0	0	0	0	0	0	0	125.00	1	1	0	1	0	0	2	0	1	1	0
Lyons	4,500	13	34.66	2	15.4	0	0	0	0	0	0	0	0	0	0	0	....	2	3	0	2	0	0	1	0	3	2	0
Newark	3,500	3	10.30	1	33.0	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	1	0	0	0	1	0
Arcadia	5,700	2	4.80	2	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	2
Palmyra	4,800	8	20.00	3	37.5	0	0	1	0	0	0	0	0	0	0	2	375.00	0	1	0	2	0	0	0	0	0	1	1
Wolcott	3,153	2	7.00	1	50.0	1	0	0	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	0	1
ROCHESTER	*101,000	152	18.06	45	31.6	0	0	5	0	0	2	0	0	0	12	11	197.37	10	24	0	7	8	14	20	6	7	6	20
Brockport	4,500	6	16.00	1	16.6	0	0	1	0	0	0	0	0	0	0	0	166.67	0	0	0	0	0	0	1	0	1	1	2
Mendon	3,200	7	26.25	2	28.6	0	0	0	0	0	0	0	0	0	0	1	142.85	1	0	0	0	1	0	2	1	0	0	1
Brighton	3,736	5	16.00	0	......	0	0	0	0	0	0	0	0	0	1	1	400.00	1	1	0	0	0	0	0	1	0	0	0
LOCKPORT	16,000	20	15.00	0	......	1	0	0	0	0	0	0	0	0	0	1	100.00	5	2	0	0	0	2	4	1	0	0	4
Niagara	7,500	7	11.20	4	57.1	0	0	1	0	0	0	0	0	0	1	3	714.28	0	1	0	0	0	1	0	0	0	0	0
Tonawanda	4,900	10	24.06	4	40.0	0	0	0	1	0	1	0	0	0	0	2	400.00	0	0	0	1	0	0	2	1	0	2	0
Amherst	4,518	1	2.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Hamburg	3,235	1	3.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Aurora	3,000	8	32.00	5	62.5	0	0	0	0	0	0	0	0	0	0	4	500.00	0	1	0	0	0	0	1	0	0	0	2
Rest of district	....	186	....	35	19.0	0	0	5	1	0	3	1	1	0	10	25	....	8	16	2	15	8	13	25	7	6	23	17
Totals for the State.	....	6,251	....	2,309	37.0	35	...	145	110	5	39	10	12	98	314	839	241.08	475	886	59	412	316	358	651	137	271	398	681

REMARKS.— The total reported mortality for the month is 6,251, the percentage of infant mortality being 37.0. For the three summer months the average monthly mortality was 8,268, the percentage of infant mortality being 44.1, and the ratio per 1,000 of deaths from all zymotic diseases being 325.75, diarrhœal diseases causing 222 per 1,000 of all deaths. For this month the ratio per 1,000 of deaths from all zymotic diseases is 241.08; from diarrhœal diseases, 134.22; from typhoid fever, 23.20. From consumption the ratio per 1,000 is 141.74, and from acute respiratory diseases, 76.00. Deaths from small-pox are reported from New York city alone. For the month of August 182 additional delayed returns have been received, of which 52 were under five years of age.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during October, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST., Totals	....	3,806	....	1,388	......	14	4	75	59	3	45	3	10	52	276	237	....	396	651	40	214	230	213	372	100	161	198	453
NEW YORK CITY	*1,397,395	2,392	20.51	872	36.4	13	2	50	35	3	14	2	4	35	155	170	201.28	253	439	23	125	163	125	213	68	95	159	246
BROOKLYN	*665,600	1,079	19.44	402	37.5	0	2	22	16	0	21	1	4	10	87	56	205.55	115	159	14	64	54	66	127	26	38	22	173
Gravesend	5,000	1	2.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	0
New Lots	19,000	40	25.26	24	60.0	0	0	0	1	0	1	0	0	0	5	0	175.00	2	6	0	9	0	2	5	0	2	0	7
New Utrecht	4,742	6	15.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	1	2	0	0	0	2
Flatlands	3,127	5	19.35	4	80.0	0	0	0	0	0	0	0	0	0	1	1	200.00	0	0	0	1	0	1	1	0	0	0	0
LONG ISLAND CITY	*21,000	28	16.00	13	46.5	0	0	1	1	0	0	0	0	2	5	0	321.42	3	3	1	2	1	0	2	1	3	0	3
Newtown	*10,000	27	32.40	10	47.0	0	0	1	1	0	4	0	0	0	5	0	407.40	3	2	0	3	0	0	0	0	0	4	4
Oyster Bay	*12,000	10	10.00	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	4	0	0	1	1	1
North Hempstead	8,000	6	9.00	2	33.3	0	0	0	0	0	1	0	0	0	2	0	500.00	0	1	0	0	1	0	0	1	0	0	0
Jamaica	10,089	9	10.80	2	22.2	0	0	0	0	0	0	0	0	0	1	0	111.11	0	1	0	1	0	1	1	1	2	1	0
Babylon	4,739	7	17.70	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	3	1	3	0	0	0	0
Southold	7,267	3	5.00	0	......	0	0	0	1	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	1	0	1	0	0
Southampton	6,352	10	18.89	4	40.0	0	0	0	0	0	0	0	0	1	0	0	100.00	1	4	0	1	0	0	1	0	0	0	2
Edgewater	*10,000	15	18.00	4	26.7	0	0	0	0	0	1	0	0	0	1	1	200.00	1	4	0	1	1	0	2	0	2	1	0
Northfield	7,014	5	8.59	1	20.0	0	0	0	0	0	0	0	0	1	0	0	200.00	2	0	0	0	1	0	1	0	0	0	0
Westfield	5,289	10	22.64	4	40.0	0	0	0	0	0	0	0	1	0	0	1	200.00	1	3	0	0	0	2	0	0	2	0	0
YONKERS	*22,000	41	22.37	14	34.1	0	0	1	1	0	0	0	0	1	3	4	243.90	6	6	1	2	1	3	4	0	2	3	3
Westchester	*6,900	7	12.17	2	28.6	0	0	0	0	0	0	0	0	0	1	0	....	2	2	0	0	0	0	0	0	0	1	1
Mount Vernon	*5,000	5	12.00	3	60.0	1	0	0	0	0	0	0	0	0	1	0	400.00	1	0	0	0	0	0	0	0	0	1	1
Rye	3,500	6	20.56	2	33.3	0	0	0	1	0	0	0	0	1	1	0	500 00	0	0	0	1	0	1	1	0	0	0	[illegible]
Sing Sing	*6,500	11	20.31	4	36.4	0	0	0	0	0	0	0	0	0	3	0	272.72	1	0	1	0	0	0	2	0	2	2	[illegible]
New Rochelle	5,276	9	20.47	2	22.2	0	0	0	0	0	0	0	0	0	1	0	111.11	1	2	0	1	0	0	2	0	1	0	1
Rest of district	....	74	....	18	24.3	0	0	0	0	0	3	0	1	1	4	4	175.67	3	17	0	3	3	6	4	3	10	3	9
HUDSON VALLEY DIST. Totals	....	643	....	192	......	7	..	25	10	1	3	3	...	2	87	23	....	49	81	9	41	37	55	57	16	29	36	69
ALBANY	96,000	170	21.25	69	40.6	3	0	0	0	1	0	0	0	1	37	7	305.88	7	21	1	14	9	15	11	2	4	3	31
West Troy	13,000	19	17.54	4	21.0	0	0	0	0	0	0	0	0	0	1	0	52.60	10	1	0	1	1	0	3	0	1	0	1
Hoosac Falls	*4,000	9	27.00	2	22.2	1	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	2	0	0	2	[illegible]
TROY	*60,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	9	27.00	20	31.0	3	0	4	1	0	0	0	0	1	5	6	216.50	9	17	5	6	7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
HUDSON	*10,000	23	27.60	10	43.5	0	0	0	0	0	0	1	0	0	8	0	391.30	1	1	0	1	3	5	1	1	0	1	0
KINGSTON	21,100	33	17.82	10	33.3	0	0	1	2	0	0	0	0	0	9	0	363.63	3	2	0	6	2	2	0	1	4	1	0
Wawarsing	8,547	5	8.02	0	......	0	0	0	1	0	0	0	0	0	0	0	200.00	0	1	0	0	1	0	0	1	0	1	0
Rosendale	5,000	6	14.40	2	33.3	0	0	0	0	0	0	0	0	0	1	0	166.67	1	0	0	0	0	0	1	1	0	0	2
Marbletown	4,000	1	3.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
Esopus	4,736	4	10.14	2	50.0	0	0	1	0	0	0	0	0	0	2	0	750.00	0	0	0	0	0	1	0	0	0	0	0
Saugerties	4,000	4	12.00	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	1	0	0	0	2
POUGHKEEPSIE	20,200	33	19.60	5	15.2	0	0	2	2	0	0	0	0	0	0	1	151.18	1	8	1	1	0	3	5	1	2	1	5
Fishkill	10,732	20	22.36	6	30.0	0	0	0	0	0	1	0	0	0	7	0	400.00	2	1	0	2	0	1	0	1	1	0	4
Wappinger's Falls	5,000	6	14.40	2	33.3	0	0	0	0	0	1	0	0	0	1	0	333.33	1	1	0	0	1	0	1	0	0	0	0
NEWBURGH	20,000	0	....	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	0
Port Jervis	9,000	9	12.00	4	44.4	0	0	1	0	0	0	0	0	0	0	0	111.11	1	0	0	0	0	0	2	0	2	0	3
Middletown	10,000	9	10.80	2	22.2	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	1	0	1	0	0	1	2	1
Goshen	4,387	5	13.68	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	0	0	0	2	0	1	0	0	0	1
Haverstraw	7,000	7	12.00	2	28.6	0	0	0	0	0	0	0	0	0	1	0	142.85	0	3	0	1	0	0	0	1	1	0	0
Clarkstown	4,378	4	11.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	0	0	0	1	0
Ramapo	5,000	1	2.40	1	100.0	0	0	0	0	0	0	0	0	0	1	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Rest of district	....	140	....	28	20.0	0	0	10	3	0	0	2	0	0	11	6	228.50	6	17	2	6	10	14	14	4	8	15	12
ADIRONDACK & NORTHERN DIST.: Totals	....	190	....	54	.....	..	...	3	...	1	...	...	2	1	12	13	....	8	31	5	18	7	15	23	2	7	15	27
Argyle	3,700	3	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	0	1	0	0	0
Greenwich	3,861	2	7.00	0	......	0	0	0	0	0	0	0	0	0	0	1	500.00	0	1	0	0	0	0	0	0	0	0	0
Fort Ann	4,267	2	5.62	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	0	0	0	0	0
Fort Edward	4,880	8	20.00	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	0	5	0	1	0	1	0	0	1	0	0
Queensbury	10,000	13	15.60	6	46.2	0	0	0	0	0	0	0	0	0	0	0	....	1	2	3	2	2	1	1	0	1	0	0
Ticonderoga	3,304	3	10.90	0	100.0	0	0	0	0	0	0	0	0	0	3	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Crown Point	4,287	1	2.80	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Port Henry	2,525	1	4.70	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	0
Malone	7,908	7	10.63	3	42.9	0	0	0	0	0	0	0	0	0	2	1	428.57	0	0	0	0	0	0	0	0	0	1	3
OGDENSBURGH	11,000	19	20.73	9	47.3	0	0	0	0	0	0	0	0	1	1	2	210 52	1	3	1	0	0	3	1	0	1	1	4
Gouverneur	5,000	5	12.00	1	20.0	0	0	0	0	0	0	0	0	0	2	0	400.00	0	1	0	1	0	0	0	1	0	0	0
Ellisburgh	4,812	4	10.00	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	0	0	0	1	0	0	0	0	0	1	1
WATERTOWN	*12,269	10	9.80	2	20.0	0	0	0	0	0	0	0	0	0	0	1	100.00	0	3	0	1	0	0	4	0	0	0	1
Cape Vincent	3,143	2	7.64	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	0	0
Rest of district	....	110	....	30	27.3	0	0	3	0	1	0	0	2	0	4	7	154.55	6	13	1	10	4	8	17	0	4	12	18
MOHAWK VALLEY DIST: Totals	....	233	....	48	......	1	...	10	7	...	...	...	1	2	14	10	....	23	34	1	12	8	27	34	6	9	17	18
SCHENECTADY	15,000	17	13.60	6	35.3	1	0	1	0	0	0	0	0	0	1	1	233.00	1	3	0	0	1	4	3	0	1	0	0
Schoharie	3,350	2	7.16	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	1	0	0
Middleburgh	3,376	1	3.55	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
AMSTERDAM	13,000	12	11.08	4	33.3	0	0	0	0	0	0	0	0	0	1	0	81.33	3	2	0	0	0	3	2	0	0	0	1
Johnstown	*6,000	1	2.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	0
Gloversville	*8,000	6	9.00	1	16.7	0	0	1	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	3	1	0	0	0	0
Little Falls	7,300	8	13.15	2	25.0	0	0	0	1	0	0	0	0	0	3	0	500.00	1	0	0	1	1	0	0	0	1	0	0
Ilion	4,200	4	11.43	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	1	1	1	0	0	0	0	0	0	0	0
Herkimer	3,000	9	36.00	4	44.4	0	0	0	0	0	0	0	0	1	0	0	111.11	1	0	0	0	2	0	1	0	1	2	1
UTICA	*39,000	55	16.92	11	20.0	0	0	0	2	0	0	0	0	0	6	2	181.82	6	11	0	6	1	4	6	3	1	2	5
ROME	12,045	18	18.00	3	16.6	0	0	0	0	0	0	0	1	0	0	4	277 78	0	1	0	1	0	0	7	0	0	3	1
Boonville	4,000	4	12.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	1	0	0	0	1	1

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST.:																												
Camden	3,400	8	28.23	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	1	0	4	0	0	0	0
Waterford	4,326	8	22.20	1	12.5	0	0	2	0	0	0	0	0	0	0	0	250.00	1	1	0	1	0	2	1	0	0	0	0
Ballston Spa	3,300	6	21.82	1	16.7	0	0	2	0	0	0	0	0	1	0	0	500.00	1	0	0	0	0	0	0	1	0	1	0
Saratoga Springs	10,000	14	16.80	3	21.4	0	0	1	3	0	0	0	0	0	0	1	385.71	0	0	0	0	0	3	1	0	1	3	1
Rest of district	....	60	....	10	16.6	0	0	3	1	0	0	0	0	0	3	0	116.67	4	12	0	2	2	7	8	2	3	5	8
SOUTHERN TIER DIST.:																												
Totals	... ...	114	......	27	....	1	...	7	3	..	2	..	1	1	5	4	....	7	16	...	11	4	5	18	5	2	10	12
BINGHAMTON	*20,000	24	14.40	5	20.8	0	0	2	2	0	0	0	0	0	0	0	166.67	1	2	0	4	2	0	4	1	1	2	3
Owego	*6,000	5	10.00	1	20.0	0	0	0	1	0	0	0	0	0	0	0	200.00	0	1	0	0	0	0	1	0	1	1	0
Candor	4,323	3	8.33	0	. .	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	2	0	0	0	0
ELMIRA	25,000	21	10.08	6	28.6	0	0	0	0	0	0	0	0	0	2	1	142.86	3	7	0	0	0	1	4	0	0	0	3
Bath	7,400	9	14.60	1	11.1	0	0	0	0	0	0	0	0	0	0	1	111.11	0	3	0	0	2	0	0	0	0	2	1
Olean	8,000	7	10.50	3	42.9	0	0	0	0	0	0	0	0	1	2	0	528.57	0	0	0	1	0	1	0	0	0	4	1
Jamestown	*12,000	13	13.00	4	30.7	1	0	1	0	0	2	0	1	0	0	0	384.62	1	0	1	3	0	1	2	1	0	0	0
Westfield	*3,000	4	12.67	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	1	1	0	0	0
Fredonia	2,800	2	8.57	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	1	0
Rest of district	....	26	....	5	19.2	0	0	4	0	0	0	0	0	0	1	1	230.77	1	2	0	3	0	1	4	2	0	3	4
EAST CENTRAL DIST.:																												
Totals	... .	200	....	33	.....	...	..	11	2	...	..	...	1	1	5	11	....	7	44	...	13	6	14	29	10	7	17	22
Walton	3,541	7	23.66	2	28.5	0	0	1	0	0	0	0	0	0	0	1	285.71	0	1	0	0	0	0	0	1	0	1	2
Franklin	3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	1	0	0	0	1	0
Delhi	3,000	4	16.00	0	......	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	1	1	0	1	0	0	0
Liberty	3,209	8	30.00	1	12.5	0	0	0	0	0	0	0	0	0	2	0	250.00	1	1	0	1	0	1	1	0	0	1	0
Cooperstown	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	0	0	0	1	0
Otsego	4,700	3	7.66	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	0	0	1	0
Oneonta	*5,000	6	14.40	2	22.2	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	0	1	0	0	1	1	0	0	2
Worcester	*3,000	2	8.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	1	0	0	0	0	0	0
Oneida	5,000	6	14.40	0	.....	0	0	2	0	0	0	0	0	1	0	0	500.00	0	1	0	0	0	0	2	0	0	0	0
Brookfield	2,685	1	3.26	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	0	0
SYRACUSE	*65,000	81	14.95	16	19.8	0	0	5	2	0	0	0	0	0	2	4	160.25	4	18	0	3	2	7	14	2	7	1	10
Geddes	7,000	7	12.00	2	28.6	0	0	1	0	0	0	0	0	0	0	0	142.86	0	2	0	2	0	0	1	0	0	0	1
Cortland	7,[illegible]	[illegible]	[illegible]	2	40.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	[illegible]	0	1	0	0	1	0	0	0	2

Homer	3,000	4	16.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	1	1	0	0	0
Rest of district	....	60	....	7	11.7	0	0	2	0	0	0	0	1	0	0	3	100.00	2	17	0	4	1	3	8	3	0	11	5
WEST CENTRAL DIST.:																												
Totals	....	160	....	28	.....	3	...	7	3	...	...	...	...	1	4	12	....	9	15	1	13	7	8	23	7	7	22	18
AUBURN	*26,000	24	11.08	6	25.0	3	0	1	1	0	0	0	0	0	1	1	291.67	4	4	0	1	1	0	2	0	0	2	3
Ithaca	[10,000	10	12.00	2	20.0	0	0	2	0	0	0	0	0	0	1	0	300.00	0	0	0	1	1	0	2	0	0	2	1
Waterloo	*4,500	2	5.34	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	0	0
Hector	5,000	4	9.60	0	.....	0	0	0	0	0	0	0	0	0	0	1	250.00	0	0	0	0	0	0	0	0	0	2	1
Seneca Falls	6,853	4	7.00	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	1	0	0	0	0	1	0	1	0	0	0
Manchester	*4,000	3	9.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	1	0
Phelps	*7,000	5	8.59	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	0	0	1	0	1	0	1	0	0	1
Canandaigua	6,300	12	22.89	5	41.7	0	0	1	0	0	0	0	0	0	0	2	250.00	1	1	1	1	0	1	0	0	1	1	2
Geneva	*6,000	7	14.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	0	2	0	2	0
Penn Yan	4,500	4	10.67	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	2	0
Lima	*2,800	2	8.47	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	1	0
Le Roy	3,000	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	2	0
Rest of district	....	80	....	11	13.7	0	0	3	2	0	0	0	0	1	2	6	175.00	2	6	0	8	5	4	17	1	6	7	10
LAKE ONTARIO & WESTERN DIST.: Totals	....	334	....	83	.....	1	...	13	1	...	3	...	...	1	26	14	....	27	52	2	20	14	25	47	14	16	26	32
OSWEGO	*24,000	20	10.00	5	25.0	0	0	0	0	0	0	0	0	0	0	2	....	1	6	0	2	1	0	1	2	2	2	1
Richland	4,000	6	18.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	2	0	1	1	1
Fulton	*4,000	4	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	2	0	1
Lyons	6,000	13	26.00	4	30.8	0	0	0	1	0	0	0	0	0	0	0	76.92	3	2	0	1	0	1	0	0	1	1	3
Newark	3,500	2	7.00	1	50.0	0	0	0	0	0	0	0	0	0	0	1	....	0	0	0	0	0	0	0	1	0	0	0
Palmyra	4,800	6	15.00	2	33.3	0	0	1	0	0	0	0	0	0	0	0	166.67	1	1	0	0	0	1	1	0	0	1	0
Wolcott	3,753	2	6.40	1	50.0	1	0	0	0	0	0	0	0	0	0	0	500.00	0	0	0	1	0	0	0	0	0	0	0
Clyde	*3,000	6	24.00	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	1	0	0	0	0	2	1	0	0	0	1
ROCHESTER	*101,000	142	13.83	53	37.3	0	0	9	0	0	2	0	0	0	22	9	295.77	9	22	1	6	7	6	22	2	5	9	11
Brockport	4,500	5	13.33	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	1	0	0	0	1
Greece	*5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	1	0	0	0	0	1	0	0
Mendon	3,200	2	7.50	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	1	0	0
Brighton	3,736	a3	9.72	1	33.3	0	0	1	0	0	0	0	0	0	0	0	333.33	0	1	0	0	0	0	1	0	0	0	0
Albion	5,147	b12	28.05	2	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	3	1	3	1	1	0	1	2
LOCKPORT	16,000	16	12.00	0	.....	0	0	1	0	0	0	0	0	0	0	0	62.50	3	3	0	0	2	1	2	2	0	2	0
Tonawanda	4,900	7	17.14	1	14.3	0	0	0	0	0	0	0	0	0	1	0	142.85	0	0	0	0	0	0	1	0	0	3	2
Aurora	3,000	4	12.67	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	0	0	0	0	1
Rest of district	....	80	....	7	8.8	0	0	1	0	0	1	0	0	1	3	1	87.77	7	10	1	6	3	9	14	6	3	6	8
Totals for the State	....	5,680	....	1,853	32.6	27	4	151	85	5	53	6	15	61	429	324	204.22	525	927	58	342	313	362	603	160	238	341	651

REMARKS. — The total reported mortality for the month is 5,680; the percentage of infant mortality being 32.6. The ratio per 1,000 from all zymotic diseases to the total mortality is 204.22; from typhoid fever, 26.59; from diarrhœal diseases, 57.04, and from croup and diphtheria, 75.53. From consumption the ratio per 1,000 is 163.20, and from acute respiratory diseases, 92.43. There were five deaths from small-pox during the month, three of which occurred in New York, one in Albany and one in Essex county. For the month of September 400 delayed returns have been received, of which 110 were under five years of age.

a Also ten deaths in Monroe county hospital. *b* Also two deaths in Orleans county hospital.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during November, 1885.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrheal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrheal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	....	3,727	....	1,260	....	14	2	74	54	8	65	13	9	47	348	80	....	529	589	44	198	241	225	400	93	163	225	306
NEW YORK CITY	*1,397,395	2,361	20.31	822	34.5	14	2	34	24	8	24	11	7	36	213	50	139.17	341	380	25	116	169	145	242	69	119	180	155
BROOKLYN	*665,600	1,058	19.07	351	33.1	0	0	37	26	0	35	2	1	11	110	20	238.73	156	169	16	51	60	51	119	19	25	31	119
Gravesend	5,000	8	19.20	1	12.5	0	0	0	1	0	0	0	0	0	1	1	375.00	0	0	0	1	0	0	2	0	2	0	0
New Lots	19,000	29	18.31	11	37.9	0	0	0	1	0	0	0	0	0	5	3	310.37	1	1	1	4	1	2	6	1	0	0	3
New Utrecht	4,742	9	22.77	2	22.2	0	0	0	1	0	0	0	0	0	0	0	111.11	2	2	0	1	0	0	2	0	0	0	1
Flatlands	3,127	3	11.50	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	1	0	0	1	0	0	0	0	0	0	0
LONG ISLAND CITY	*21,000	32	18.29	12	37.5	0	0	1	0	0	1	0	0	0	3	0	156.25	1	10	0	3	4	1	0	0	2	0	6
Newtown	*10,000	16	19.20	8	50.0	0	0	0	0	0	2	0	0	0	6	0	500.00	1	1	0	2	0	1	0	0	0	0	3
Oyster Bay	*12,000	11	11.00	2	18.2	0	0	0	0	0	0	0	0	0	1	0	90.90	3	0	0	1	0	3	0	0	1	1	1
North Hempstead	*7,000	7	12.00	3	42.9	0	0	0	0	0	1	0	0	0	0	1	285.71	0	1	0	0	1	2	0	0	1	0	0
Jamaica	10,069	4	....	1	25.	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	1	1	0	0	1	0
Babylon	4,739	7	17.72	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	1	1	0	1	2	0	1	0	0
Southold	7,267	5	12.65	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	2	0	0	0	0	1
Southampton	6,352	9	17.00	1	11.	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	1	2	0	0	0	2	1
Edgewater	10,000	12	....	6	50.0	0	0	0	0	0	1	0	0	0	0	0	83.33	4	1	0	2	1	1	2	0	0	0	0
Northfield	7,014	6	10.29	2	33.3	0	0	1	0	0	0	0	0	0	0	0	166.67	0	1	0	2	0	0	1	0	0	0	1
Westfield	5,289	9	20.41	3	33.3	0	0	0	0	0	0	0	0	0	1	0	111.11	0	3	0	0	1	1	1	0	0	1	1
YONKERS	*22,000	31	17.00	9	29.0	0	0	0	0	0	0	0	1	0	3	0	129.32	4	7	1	2	1	4	4	1	2	1	0
Westchester	*6,900	14	21.45	5	35.7	0	0	0	0	0	1	0	0	0	2	0	214.29	2	2	0	3	0	0	1	1	0	1	1
Mount Vernon	*5,000	15	36.00	4	26.7	0	0	0	0	0	0	0	0	0	0	1	66.67	3	0	0	3	0	1	3	0	1	0	3
Sing Sing	*6,500	12	22.15	4	25.0	0	0	0	0	0	0	0	0	0	2	0	166.67	0	0	0	0	0	1	0	0	1	3	5
New Rochelle	5,276	2	4.36	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	0	0
Rest of district	....	61	....	9		0	0	0	2	0	0	0	0	0	1	2	....	9	8	0	2	2	6	13	2	8	4	5
HUDSON VALLEY DIST.:																												
Totals	....	619	....	164	....	6	...	18	5	...	2	3	1	2	67	20	....	74	85	5	33	33	57	88	21	30	38	61
ALBANY	96,000	171	21.35	50	29.2	0	0	6	0	0	0	0	0	0	32	9	390.70	15	17	2	3	10	17	18	3	4	9	26
COHOES	*20,000	a34	20.40	13	37.6	0	0	0	1	0	1	3	0	0	5	1	323.53	6	1	0	2	1	1	3	2	1	4	2
West Troy	13,000	20	18.46	7	35.0	0	0	0	0	0	0	0	0	0	0	0	....	7	1	0	5	1	0	4	0	2	0	0
Hoosick Falls	*4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	1	1	0	1
TROY	*60,000	89	17.80	24	27.	4	0	3	0	0	0	0	0	0	3	2	134.83	12	18	0	6	5	10	11	4	2	3	6

Lansingburgh	*9,700	17	21.03	2	11.8		0	0				0	0	0	1	0	117.65		5	0	0	4		3	0	1	0	0
Green Island	*5,000	4	9.60	3	75.0		0	0		0		0	0	0	0	1	250.00	2		0	0	0	0	0	0	0	0	0
Greenbush	7,200	10	16.67	3	30.0	0	0			0	0	0	0	0	1	0	200.00	3		0	0	1	0	1	0		0	2
Coxsackie	4,000	4	12.00	1	25.0	0	0	0		0	0	0	0		0	0	....	0		0	1	0	0	1	0	0	0	1
Catskill	*4,500	3	8.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0		0	0	0	0	0	1	0	0	0
HUDSON	*10,000	12	14.40	3	25.0	0	0	0	0	0	0	0	0	0	3	2	416.67	0		0	0	0		3	0	0	0	0
KINGSTON	21,100	23	13.08	9	39.1	1	0	0	2	0	0	0		1	2	2	347.83	3		1	3	2		1	0	0	0	0
Wawarsing	8,547	8	11.23	1	12.5	0	0		0	0	0	0		0	0	0	....	2		0	0	0		0	2	0	0	0
Rosendale	5,000	3	7.20	1	33.3	0	0		0	0	0	0		0	0	0	....	0	0	0	1	0		0	0	1	1	0
Marbletown	4,000	4	12.00	1	25.0	0	0		0	0	0	0		0	0	0	....	0	0	0	0	0			0		0	1
Esopus	4,736	3	7.60	1	33.3	0	0		0	0	0			0	0	0	....	0	1	0	0	0			0		1	0
Saugerties	*4,000	2	6.00	0	......	0		0	0	0	0			0	0	0	....	0	1	0	0	0			0	0		0
POUGHKEEPSIE	20,200	32	19.01	2	6.2	0		1	0	0	0		1	0	0	0	58.83	2	8	0	2	0			0	3		0
Fishkill	10,732	14	15.65	4	28.5	0		3	0	0	0		0	1	4	0	571.42	1	1	0		0			0	2	0	0
Wappinger's Falls	5,000	5	12.00	2	40.0	0	0	0	1	0	0		0	1	0	0	400.00	2	0	0		1			0	0	0	0
NEWBURGH	20,000	25	15.00	6	24.0	0	0	0	0	0	0		0	0	4	0	160.00	3	5	0		3			0	0	2	1
Port Jervis	9,000	6	8.00	2	33.3	0	0	0	0	0				0	0	0	....	0	1	0		0			1		0	1
Middletown	10,000	8	9.60	2	25.0	0			0	0				0	0	0	....	0	1	0		1			1			2
Haverstraw	7,000	9	15.43	2	22.2	0			0	0				0	0	0	....	0	1	1		0	0		0			3
Ramapo	5,000	2	4.80	0	......				0	0				0	0	0	....	1	0	0		0	0	1	0	0		0
Rest of district	....	137	....	23	......				1	0			0	0	12	2	....	14	14	1		4	13	25	6		14	15
ADIRONDACK & NORTHERN DISTRICT: Totals	....	168	....	26	......	...	...	5	2		...			...	12	1	....	13	27	5	14	3	20	15	7	8	18	16
Argyle	3,700	2	6.50	2	100.0	0	0	0	0		0			0	0	0	....	0	0	0	1	0		1	0	0		0
Greenwich	3,861	2	6.20	1	50.0	0	0	0	0					0	0	0	....	0	0	0		0			0	0		2
Fort Edward	4,880	6	14.76	1	16.7		0	0	0					0	0	0	....	0		0		0	0		0		1	0
Queensbury	10,000	11	13.20	0	......		0	0	0				0	0	0	0	....	0		3		0	1		0	0	0	2
Ticonderoga	3,304	6	21.82	2	33.3			0	0				0	0	2	0	333 33	0		0		0	0		0	0	1	0
Crown Point	4,287	4	11.20	1	25.0			0	0	0			0	0	0	0	....			0		0	0			0	1	0
Port Henry	2,525	1	4.70	0	......		0	0	0				0	0	0	0	....	0		0		0	0			1	0	0
Malone	7,908	5	7.46	0	......		0	1	0	0			0	0	0	0	200.00	0		0		0				0	1	0
OGDENSBURG	11,000	11	12.00	3	27.3		0	0	0	0			0	0	2	0	181.81			0		0				1	0	1
Gouverneur	*5,500	11	24.00	3	27.3		0	1	0	0	0	0		0	4	0	454.54			0		0		0	0	0	0	0
Ellisburgh	4,812	3	7.50	0	......	0	0	0	0	0	0	0		0	0	0	....	0		0		0		0	0	0	1	0
WATERTOWN	*12,269	16	15.71	4	25.0	0	0	1	1	0	0			0	0	1	187.50	1		0	1	1	1	2	0	0	2	1
Cape Vincent	3,143	1	3.83	1	10.0	0	0	0	0	0	0			0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
Rest of district	....	90	....	11	......	0	0	2	1	0	0		2	0	4	0	....	8	7	2		2	14			5	11	11
MOHAWK VALLEY DIST.: Totals	....	230	....	43	......	2		5	2		2				14	1	....	22	35	3	15	11	24	20	6	9	33	22
SCHENECTADY	15,000	18	11.40	2	11.1	0		1	1	0	0	0		0	1	1	166.67	3				1	3	1		0	1	1
Schoharie	3,350	9	32.38	0	......	0	0	0	0	0	2	0		0	0	0	222.22	1				0	2	0		0	2	1
Cobleskill	3,371	2	7.12	0	......	0	0	0	0	0	0	0		0	0	0	....			0	0	0	1	0		0	0	0
Middleburgh	3,376	2	7.12	1	50.0			0	0	0	0	0		0	0	0	....			0	0	0	0	0		0	1	0
AMSTERDAM	13,000	16	14.77	5	31.2		0	0	0	0	0	0		0	1	0	125.00	1	5	0	0	1	0	5		0	1	1
Johnstown	*6,000	6	12.00	2	16.7	0			0	0	0	0		0	0	0	....	0	3	0	0	1	0	2		0	0	0
Gloversville	*8,000	6	9.00	3	50.0	0			0	0	0	0	0	0	0	0	....	0	0	0		0	2			0	0	0
Little Falls	7,300	5	8.22	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0		0	0			0	1	1
Ilion	4,200	5	14.29	0	......	0	0	0	0	0	0	0	0	0	0	0	....		1	1	0	1	1	0	0	0	0	0
Herkimer	3,000	3	20.00	1	20.0	0			0	0	0	0	0	0	0	0	....		0	0	2	1	0	1	0	0	0	0
UTICA	*39,000	60	18.46	18	30.0	0			0	0	0	0	1	0	7	0	133.33	14	6	2	5	1	6	5		3	4	6
ROME	12,045	17	17.00	1	5.8	0			0	0	0	0	0	0	0	1	58.62	0	3	0	0	1	3	1		3	2	2
Boonville	4,000	3	9.00	0	......	0	0		0	0	0	0	0		0	0	....		0		0	1	0	0		0	0	1

a Fifty deaths in Cohoes in October: 17 under five years, 13 zymotic and 8 from consumption.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MOHAWK VALLEY DIST.:																												
Camden	3,400	2	7.06	0	......	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	1	0	0	0	0	0
Waterford	4,326	4	11.11	1	25.0	0	0	0	0	0	0	1	0	0	0	0	250.00	2	0	0	0	0	0	0	0	1	0	0
Ballston Spa	3,300	6	21.82	1	16.7	1	0	1	0	0	0	0	1	0	0	0	500.00	0	2	0	0	0	0	0	0	0	1	0
Saratoga Springs	10,000	21	25.20	1	4.8	0	0	2	1	0	0	0	0	0	0	0	142.86	0	3	0	1	1	0	1	3	0	5	4
Rest of district	....	43	......	7	......	0	0	0	0	0	0	0	0	1	5	0	....	4	7	0	3	2	5	2	2	2	5	5
SOUTHERN TIER DIST.:																												
Totals	....	83	....	20	......	...	...	4	...	...	2	...	...	1	2	2	....	5	8	1	8	5	10	11	4	4	6	10
BINGHAMTON	*20,000	16	9.60	4	25.0	0	0	0	0	0	2	0	0	0	0	0	125.00	1	2	0	2	0	2	4	1	0	1	1
Candor	4,323	3	8.33	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	0	0	1	0	1	0
ELMIRA	25,000	18	8.64	3	16.6	0	0	1	0	0	0	0	0	0	0	0	55.55	2	2	0	1	1	1	2	2	3	1	2
Hornellsville	10,000	8	9.60	3	37.5	0	0	1	0	0	0	0	0	0	0	0	125.00	1	0	0	1	1	2	0	0	0	0	2
Bath	7,400	a5	8.11	1	20.0	0	0	1	0	0	0	0	0	1	0	0	a400.00	0	0	0	1	1	0	0	0	0	1	0
Olean	8,000	3	4.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	0	0	0	0	0	0
Jamestown	*12,000	12	12.00	5	41.7	0	0	1	0	0	0	0	0	0	0	0	83.33	0	1	1	1	0	2	2	0	0	0	4
Westfield	3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	1	0	0
Rest of district	....	16	....	2	......	0	0	0	0	0	0	0	0	0	2	1	....	0	2	0	2	1	3	2	0	0	2	1
EAST CENT. DIST: Totals	....	177	....	30	......	3	...	7	4	...	...	...	1	1	5	4	....	16	25	...	7	8	17	21	11	17	12	21
Walton	3,541	2	6.78	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	1	0
Delhi	3,000	5	30.00	1	20.0	1	0	0	0	0	0	0	0	0	0	2	800.00	0	0	0	0	0	0	0	2	0	0	0
Cooperstown	*3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	1	0	1
Oneonta	*5,000	6	14.40	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	1	1	0	2
Oneida	5,000	7	16.80	1	14.3	0	0	0	0	0	0	0	0	1	1	0	285.71	1	1	0	0	0	1	1	0	1	0	0
Brookfield	3,685	2	6.51	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	1	0
Canastota	2,500	4	19.20	5	......	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	0	0	0	0	1	2	0
Baldwinsville	3,000	6	24.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	0	1	1	0	1
SYRACUSE	*65,000	65	12.00	16	24.6	0	0	0	4	0	0	0	1	0	2	1	138.46	6	9	0	3	1	4	13	1	7	0	12
Geddes	7,000	4	6.86	0	......	0	0	2	0	0	0	0	0	0	1	0	750.00	0	0	0	0	0	0	0	0	0	0	1
Cortland	7,361	10	16.30	3	30.0	0	0	0	0	0	0	0	0	0	0	1	100.00	2	2	0	0	0	1	1	1	1	1	0
Rest of district	....	62	....	7	......	1	0	4	0	0	0	0	0	0	1	0	....	4	11	0	4	3	9	5	5	4	7	3
WEST CENTRAL DIST.:																												
Totals	....	119	*........	19	......	...	...	7	1	...	...	...	1	...	4	3	....	16	17	1	10	3	12	19	5	3	10	7
AUBURN	*26,000	35	16.15	6	[illegible]	0	0	1	0	0	0	0	0	0	1	1	83.33	8	8	0	3	1	1	8	2	1	3	2

Hector	5,000	3	7.20	0	......	0	0	1	0	0	0	0	0	0	0	1	666.66	1	0	0	0	0	0	0	0	0	0	0
Seneca Falls	6,850	3	5.25	1	33.3	0	0	0	0	0	0	0	0	0	1	0	333.33	2	0	0	0	0	0	0	0	0	0	0
Manchester	*4,000	4	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	0	1	0	0	0
Phelps	*7,000	10	17.14	1	10.0	0	0	0	0	0	0	0	0	0	0	1	100.00	0	2	0	0	0	2	4	0	1	0	0
Canandaigua	6,300	4	7.62	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	0	0	0	1
Geneva	*6,000	7	14.00	2	28.6	0	0	1	0	0	0	0	0	0	0	0	142.87	0	1	1	1	1	1	0	0	0	0	1
Penn Yan	4,500	2	5.33	0	......	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	1	0	0	0	0
Lima	*2,800	2	8.57	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	1	0	0	0	0	0
Rest of district	....	49	....	8	......	0	0	3	1	0	0	0	1	0	2	0	....	3	4	0	5	1	5	11	2	1	7	3
LAKE ONTARIO & WESTERN DIST.: Totals	....	294	....	56	......	...	...	6	1	...	6	...	3	...	26	4	....	31	45	4	17	9	23	45	11	15	21	27
OSWEGO	*24,000	25	12.50	1	4.00	0	0	2	0	0	0	0	0	0	1	0	150.00	2	6	0	5	0	2	1	1	1	1	3
Richland	4,000	2	6.00	0	......	1	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	1	0	0
Fulton	*4,000	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	1	1	0	0
Lyons	*6,000	6	12.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	1	0	1	1	1
Newark	3,500	1	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	0	0
Palmyra	*4,800	3	7.50	2	66.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	2	0	0	0	0	0	0	0
Wolcott	3,753	3	9.61	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	0	0	0	0
Clyde	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	1	0
ROCHESTER	*101,000	150	17.82	39	26.0	0	0	2	0	0	2	0	2	0	19	4	193.34	14	25	2	2	7	9	32	5	5	6	14
Brockport	4,500	5	13.33	1	20.0	0	0	0	0	0	1	0	0	0	0	0	200.00	0	0	0	0	1	0	1	1	0	1	0
Mendon	3,200	3	10.94	0	......	0	0	0	0	0	0	0	0	0	1	0	333.33	0	1	0	0	0	1	0	0	0	0	0
Brighton	3,736	b5	16.06	0	......	0	0	1	0	0	0	0	0	0	0	0	b200.00	0	0	0	0	0	1	1	1	0	1	0
Albion	5,147	6	14.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	2	1	0	0	0	2
LOCKPORT	16,000	10	7.50	0	......	0	0	0	0	0	0	0	0	0	1	0	100.00	0	1	0	1	0	3	1	0	0	1	2
Tonawanda	4,900	3	7.55	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	1	0	0
Amherst	4,518	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	1	0	1	0
Hamburg	3,235	3	11.12	1	33.3	0	0	0	0	0	2	0	0	0	1	0	100.00	0	0	0	0	0	0	0	0	0	0	0
Aurora	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
Rest of district	....	59	....	7	......	0	0	1	1	0	1	0	1	0	3	0	....	10	5	2	4	1	5	6	1	4	8	5
Totals for the State	....	5,448	....	1,620	29.7	25	2	126	69	8	77	17	19	53	478	115	181.35	716	831	63	302	310	388	619	158	249	359	470

REMARKS.—The total reported mortality for the month is 5,448; the percentage of infant mortality being 29.7. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 181.85; that from typhoid fever being 23.00; from diarrhœal diseases, 21.17, and from croup and diphtheria, 87.98. From consumption the ratio per 1,000 is 152.59, and from acute respiratory diseases, 131.23. No deaths from small-pox are reported during the month outside of New York city. For the month of October 188 delayed returns have been received, among other places from Hornellsville, Penn Yan, Amherst, Seneca Falls, Flushing and Goshen.

a Not including four deaths in Soldiers' Home. *b* Besides six deaths in Monroe County Hospital.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of reports of deaths and their causes in the following districts, cities and towns, during December, 1885.

District, city or town	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DIST.: Totals	....	4,174	....	1,548	37.1	18	5	54	49	5	94	9	18	91	424	74	201.25	765	609	42	165	253	226	398	109	149	251	366
NEW YORK CITY	*1,397,395	2,743	23.55	1,048	38.2	15	5	26	27	5	43	6	11	76	293	53	204.15	486	397	26	109	175	152	243	68	102	212	213
BROOKLYN	*665,600	1,184	21.03	426	35.9	0	0	24	15	0	47	3	7	9	110	19	189.18	243	168	13	39	69	61	123	34	37	22	141
Gravesend	5,000	6	14.40	2	33.3	0	0	0	1	0	0	0	0	0	1	0	333.33	2	0	0	0	0	2	0	0	0	0	0
New Lots	*19,000	31	19.58	10	32.3	2	0	1	2	0	0	0	0	0	5	0	322.58	4	2	0	2	2	0	5	0	3	1	2
New Utrecht	4,742	3	7.60	2	66.6	0	0	0	0	0	0	0	0	0	2	0	666.66	0	0	0	0	0	0	0	0	0	0	1
Flatlands	3,127	4	15.35	2	50.0	0	0	0	0	0	0	0	0	0	1	0	250.00	2	1	0	0	0	0	0	0	0	0	0
Newtown	*10,000	10	12.00	4	40.0	0	0	0	0	0	2	0	0	1	1	0	400.00	2	2	0	1	1	0	0	0	0	0	0
Oyster Bay	*12,000	10	10.00	2	20.0	0	0	0	0	0	0	0	0	0	1	0	100.00	1	3	0	1	1	0	2	0	0	0	1
North Hempstead	*7,000	8	13.71	2	25.0	0	0	0	0	0	0	0	0	1	0	0	125.00	2	1	0	0	0	2	1	0	1	0	0
Babylon	4,739	5	12 70	0	....	0	0	0	0	0	0	0	0	0	0	0	....	3	1	0	0	0	0	0	0	0	1	0
Southold	7,267	8	13.21	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	2	0	0	3	0
Southampton	6,352	9	16.95	0	......	0	0	0	0	0	1	0	0	0	0	0	111.11	0	2	1	0	0	0	1	1	1	2	0
Edgewater	10,000	15	18.00	7	46.67	0	0	0	0	0	0	0	0	3	0	0	200.00	1	5	0	1	0	0	1	0	1	2	1
Northfield	7,014	10	17.14	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	1	0	0	2	2	0	0	1
Westfield	5,289	11	24.90	2	18.1	1	0	0	1	0	0	0	0	0	0	0	181.81	3	2	0	1	0	1	0	1	1	0	0
YONKERS	*22,000	31	16.91	16	51.6	0	0	0	1	0	0	0	0	1	3	1	193.55	8	2	1	2	1	1	7	1	0	2	0
Westchester	*6,900	9	15.65	1	11.1	0	0	0	0	0	0	0	0	0	3	0	333.33	1	5	0	0	0	0	0	0	0	0	0
Mount Vernon	*5,000	10	24.00	2	18.2	0	0	0	0	0	0	0	0	0	1	0	100.00	0	0	1	0	3	0	2	0	0	3	0
Rye	3,500	2	7.00	0	......	0	0	0	1	0	0	0	0	0	0	0	500.00	0	0	0	0	0	1	0	0	0	0	0
Sing Sing	*6,500	11	20.31	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	1	2	2	0	1	2	1
New Rochelle	5,276	9	20.47	2	22.2	0	0	2	0	0	0	0	0	0	2	0	444.44	2	1	0	0	0	1	1	0	0	0	0
Rest of district	....	45	....	14	31.1	0	0	1	1	0	1	0	0	0	1	1	111.11	3	11	0	8	0	2	6	2	2	1	5
HUD. VAL. DIST.: Totals	....	678	....	180	26.7	6	7	24	5	2	3	7	4	2	74	7	205.66	86	100	8	29	23	69	95	24	27	30	46
ALBANY	96,000	150	18.74	45	30.0	1	7	7	0	0	0	0	1	0	22	2	266.67	14	23	3	3	4	22	18	5	2	3	13
COHOES	*29,000	43	25.80	20	46.5	0	0	6	0	0	2	7	0	0	9	0	558.14	4	4	0	0	0	0	4	1	0	3	3
West Troy	13,000	26	24.00	6	23.1	0	0	1	0	0	0	0	0	0	2	0	76 92	8	1	0	1	2	2	5	0	2	0	2
Hoosick Falls	*4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	1	0	0	0	200.00	1	0	0	0	0	2	0	0	0	0	1
TROY	*60,000	83	16.60	24	28.9	2	0	5	0	0	0	0	0	0	3	2	144.58	14	13	3	9	0	12	9	5	2	2	2
Lansingburgh	*9,700	14	17.32	3	21.5	0	0	1	1	0	0	0	1	0	0	0	214.28	3	4	0	1	1	0	0	0	2	0	0

Green Island	*5,000	4	9.60	2	50.0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	0	0	0	0	2	0	0	0	0	0
Greenbush	7,200	8	11.95	5	62.5	0	0	0	0	0	0	0	0	0	2	0	250.00	3	1	0	0	0	0	0	0	1	0	1
Coxsackie	4,000	2	6.00	2	10.0	1	0	0	0	0	0	0	0	0	0	0	500.00	1	0	0	0	0	0	0	0	0	0	0
Catskill	*4,500	10	26.67	4	40.0	0	0	0	0	0	0	0	0	0	1	0	100.00	1	0	0	0	2	4	0	1	1	0	0
HUDSON	*10,000	19	21.80	4	21.0	0	0	0	1	0	0	0	0	0	2	0	157.87	3	3	0	0	1	0	4	1	1	1	2
KINGSTON	21,100	23	13.08	10	43.5	0	0	0	0	0	0	0	0	2	4	1	304.35	5	1	0	2	2	•3	1	0	0	2	0
Wawarsing	8,547	5	7.02	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	1	1	0	0	0	0
Rosendale	5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	2	0	0	0	0
Esopus	4,736	4	10.13	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	1	0	2	0	0	0	0
Saugerties	*4,000	2	6.00	0	......	0	0	0	0	1	0	0	0	0	0	0	500.00	0	1	0	0	0	0	0	0	0	0	0
POUGHKEEPSIE	20,200	30	17.82	6	20.0	0	0	0	1	0	0	0	0	0	1	0	66.66	3	10	0	1	0	3	4	3	0	3	1
Fishkill	10,732	14	15.65	4	28.6	0	0	0	0	0	0	0	0	0	4	0	285.71	1	1	0	0	0	1	1	0	3	1	2
Wappinger's Falls	5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	1
NEWBURGH	20,000	29	17.40	9	27.5	0	0	0	0	0	0	0	0	0	6	1	241.38	4	3	0	1	1	2	3	1	0	5	2
Port Jervis	9,000	10	13.33	2	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	3	0	1	1	2	0	0	2	0	0
Middletown	10,000	10	12.00	1	10.0	1	0	0	0	0	0	0	0	0	0	0	100.00	2	2	0	0	0	0	3	0	0	1	1
Goshen	4,387	*a*10	27.27	1	10.0	0	0	0	0	0	0	0	0	0	0	1	100.00	1	1	0	0	0	1	2	1	1	0	2
Haverstraw	7,000	8	13.86	3	37.5	0	0	0	0	0	0	0	0	0	0	0	....	3	0	0	0	0	0	1	1	1	1	1
Ramapo	5,000	4	9.60	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	2	0	0	0	0
Rest of district	....	159	....	25	16.0	1	0	4	2	1	1	0	1	0	15	0	152.86	12	27	2	9	8	11	31	5	9	8	12
ADIRONDACK & NORTHERN DIST.: Totals.	....	175	....	34	19.4	2	...	3	1	...	...	...	1	...	12	1	114.28	9	21	3	15	5	18	30	8	7	20	29
Argyle	3,700	4	13.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	0	1	0	0	0
Greenwich	3,861	6	18.62	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	0	0	0	0	3
Fort Ann	4,267	6	16.87	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	1	2	0	0	1	1
Fort Edward	4,880	4	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	2	1
Queensbury	10,000	12	14.40	2	16.6	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	1	0	1	4	2	0	0	1
Ticonderoga	3,304	1	3.67	0	....	0	0	1	0	0	0	0	0	0	0	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Crown Point	4,287	8	22.38	4	50.0	0	0	0	0	0	0	0	0	0	1	0	125.00	1	0	0	0	1	0	4	0	1	0	0
Port Henry	2,525	2	9.50	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	0	0	0	0	0	0	1
Malone	7,908	5	7.60	3	60.0	1	0	0	0	0	0	0	0	0	3	0	800.00	0	0	0	0	0	0	0	0	0	1	0
OGDENSBURG	11,000	21	22.90	8	38.1	0	0	0	0	0	0	0	0	0	0	0	....	2	2	1	0	1	4	1	0	0	2	8
Gouverneur	*5,500	5	10.91	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	2	0	3	0	0	0	0	0
Ellisburgh	4,812	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	1	1	0	0	0	1	1
Cape Vincent	3,143	2	7.63	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	0	0	0	0
Rest of district	....	93	....	12	12.8	1	0	2	1	0	0	0	1	0	7	1	139.79	3	12	2	12	2	4	9	4	6	13	13
MOHAWK VALLEY DIST.: Totals.	....	255	....	44	17.2	4	...	4	1	...	10	1	1	1	16	5	168.62	86	28	...	10	15	27	33	15	9	22	17
SCHENECTADY	15,000	25	20.00	5	20.0	0	0	0	1	0	2	0	0	0	4	3	400.00	2	2	0	2	1	4	0	1	2	0	1
Schoharie	3,350	14	50.15	3	21.4	0	0	1	0	0	8	0	0	0	0	0	612.87	0	1	0	1	0	6	2	1	0	0	0
Cobleskill	3,371	1	3.54	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Middleburgh	3,376	3	10.65	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	2	0	0	0	0	0
AMSTERDAM	14,000	22	18.86	6	27.3	3	0	0	0	0	0	0	0	0	1	0	181.81	3	2	0	0	0	3	5	0	3	2	0
Johnstown	*6,000	7	14.10	0	......	0	0	0	0	0	0	0	0	0	1	0	142.85	0	1	0	1	1	0	0	0	0	2	1
Gloversville	*8,000	9	13.50	1	11.1	0	0	0	0	0	0	0	0	0	1	0	111.11	0	3	0	0	1	3	0	1	0	0	0
Little Falls	7,300	3	4.93	1	33.3	0	0	0	0	0	0	0	0	0	1	0	333.33	0	0	0	0	0	1	0	0	0	1	0
Ilion	4,200	5	14.29	2	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	2	0	0	0	0	1	0	0
Herkimer	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	0	0
UTICA	*39,000	55	16.92	12	21.8	0	0	1	0	0	0	0	0	0	4	2	127.27	15	10	0	1	2	6	7	2	0	2	3
ROME	12,045	16	16.00	2	12.5	0	0	0	0	0	0	0	0	1	0	0	125.00	2	1	0	0	2	1	4	2	0	3	0
Boonville	4,000	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	1	0	1	0	0	0
Camden	3,400	7	24.70	0	......	1	0	0	0	0	0	0	0	0	0	0	142.86	1	1	0	0	0	0	0	1	1	2	0
Waterford	4,226	4	11.10	2	50.0	0	0	0	0	0	0	1	0	0	0	0	250.00	0	0	0	0	0	0	1	0	0	0	2
Ballston Spa	3,300	5	18.18	1	20.0	0	0	0	0	0	0	0	0	0	1	0	200.00	1	0	0	0	0	1	1	0	1	0	0

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
Saratoga Springs	10,000	63	14.40	1	8.3	0	0	1	0	0	0	0	0	0	0	0	83.33	2	0	0	1	0	0	3	0	0	3	2
Rest of district	....	12	....	7	11.1	0	0	1	0	0	0	0	1	0	3	0	79.36	9	6	0	2	6	5	9	5	1	7	8
SOUTHERN TIER DIST.:																												
Totals	....	149	....	23	15.6	1	...	3	2	...	...	...	3	...	6	1	106.67	16	17	2	12	8	12	23	6	6	15	16
BINGHAMTON	*20,000	19	11.40	2	22.2	0	0	0	0	0	0	0	1	0	1	0	222.22	5	1	0	0	0	3	4	1	0	2	1
Candor	4,323	3	8.33	0	......	0	0	0	1	0	0	0	0	0	0	0	333.33	0	2	0	0	0	0	0	0	0	0	0
ELMIRA	25,000	30	14.40	5	16.3	0	0	1	0	0	0	0	0	0	1	1	333.33	2	4	0	4	2	2	6	0	3	2	2
Horseheads	3,500	2	6.86	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	0
Hornellsville	10,000	2	2.40	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	1
Bath	7,600	14	6.48	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	1	0	1
Olean	8,000	11	16.50	5	45.5	1	0	0	0	0	0	0	0	0	1	0	181.81	0	2	0	0	1	1	0	0	1	1	3
Jamestown	12,000	16	16.00	4	25.0	0	0	1	0	0	0	0	1	0	2	0	250.00	4	0	0	2	0	3	2	0	0	0	1
Rest of district	....	62	....	5	8.0	0	0	1	1	0	0	0	1	0	1	0	64.51	4	7	2	6	4	3	11	5	1	8	7
EAST CENTRAL DIST.:																												
Totals	....	205	....	32	15.6	...	...	3	..	..	1	...	...	...	13	2	92.68	28	38	1	8	6	12	27	10	2	24	30
Walton	3,541	4	13.59	2	50.0	0	0	0	0	0	1	0	0	0	0	0	250.00	0	2	0	0	0	0	0	0	0	0	1
Delhi	3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	1	1	0	1	0
Cooperstown	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	1	0	0	0
Oneonta	*5,000	6	15.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	2	0	0	1	2
Worcester	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	2	0
Cazenovia	4,363	3	8.25	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	1	0	0	0	0
Canastota	2,500	4	19.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	1	0	0	0	1
Baldwinsville	3,000	4	16.00	0	......	0	0	2	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	0	0	2	0
SYRACUSE	*65,000	73	13.48	15	20.5	0	0	1	0	0	0	0	0	0	3	1	68.50	14	18	0	2	3	8	6	4	1	2	10
Geddes	7,000	5	8.57	1	25.0	0	0	0	0	0	0	0	0	0	1	0	200.00	0	1	0	0	0	0	0	0	0	0	3
Homer	3,000	4	16.00	2	50.0	0	0	0	0	0	0	0	0	0	1	1	500.00	0	0	0	0	0	0	0	0	0	1	1
Rest of district	....	92	....	12	18.0	0	0	0	0	0	0	0	0	0	8	0	86.87	14	9	1	5	3	4	16	4	1	15	12
WEST CENTRAL DIST.:																												
Totals	....	118	....	14	11.9	...	..	4	1	...	...	...	...	...	3	2	84.74	7	21	...	12	6	15	19	3	2	11	12
AUBURN	*26,000	25	11.54	3	12.0	0	0	0	1	0	0	0	0	0	0	0	40.00	2	5	0	2	0	2	6	0	2	1	4
Ithaca	10,000	7	8.40	0	......	0	0	1	0	0	0	0	0	0	0	0	142.86	0	0	0	1	1	1	2	0	0	1	0
Hector	5,000	6	14.00	0	......	0	0	1	0	0	0	0	0	0	0	0	166.67	1	0	0	0	0	0	1	1	0	2	0

Lima	4,000	3	12.85	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	0	0	0	1
Rest of district	....	62	....	5	12.9	0	0	1	0	0	0	0	0	0	3	2	96.77	4	11	0	6	8	11	9	1	0	6	6
LAKE ONTARIO & WESTERN DIST.: Totals.	....	324	....	35	10.8	1	...	4	1	...	4	...	1	1	24	1	114.20	37	41	5	22	14	26	47	17	10	32	36
OSWEGO	*24,000	26	13.00	3	11.5	0	0	1	0	0	0	0	0	0	1	0	76.92	5	4	1	0	1	3	1	2	0	4	3
Richland	4,000	6	18.00	0	......	0	0	0	0	0	0	0	0	0	1	0	166.66	0	1	0	0	0	0	1	0	0	3	0
Fulton	*4,000	5	15.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	1	1	0	0	0
Lyons	*6,000	11	22.00	3	27.3	0	0	0	1	0	0	0	0	1	0	0	181.81	2	0	0	0	0	2	3	0	1	0	1
Newark	3,500	6	20.57	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	1	2	1	0	0	0
Palmyra	*4,800	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	1	1	1	0	0	1	0	0	0	1
ROCHESTER	*101,000	147	17.46	49	33.3	0	0	1	0	0	3	0	0	0	17	0	142.85	15	21	2	9	8	8	21	5	3	13	21
Brockport	4,500	6	16.00	1	16.7	0	0	0	0	0	1	0	0	0	1	0	333.33	1	1	0	0	0	1	0	1	0	0	0
Greece	*5,000	3	7.20	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	1	0	0	1
Brighton	3,736	c4	12.85	0	......	0	0	0	0	0	0	0	0	0	1	0	250.00	1	0	0	0	0	0	1	0	0	1	0
Albion	5,000	5	12.00	3	60.0	1	0	0	0	0	0	0	0	0	0	0	200.00	1	0	0	0	0	1	2	0	0	0	0
LOCKPORT	16,000	13	9.75	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	1	0	0	2	1	2	1	0	4
Amherst	4,518	2	5.31	0	......	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	0	1	0	0	0
Hamburg	3,235	2	7.42	0	......	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	1	0	0	0	0	0	0
Aurora	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Rest of district	....	81	....	13	16.0	0	0	1	0	0	0	0	0	1	2	1	61.72	7	10	0	10	4	8	13	3	5	11	5
Totals for the State.	....	6,096	....	1,918	37.3	32	12	99	60	7	112	17	28	95	572	93	185.42	985	880	61	273	330	408	665	192	214	405	556

REMARKS.— The total reported mortality for the month is 6,078; fifty returns have been received additional, of which three are from Newtown, four from Malone, six from Westfield and ten from Seneca Falls. The ratio per 1,000 of deaths from all zymotic diseases to the total mortality is 185.42; that from typhoid fever being 16.24; from diarrhœal diseases, 15.26, and from croup and diphtheria, 93.77. From consumption the ratio per 1,000 is 141.80, and from acute respiratory diseases, 161.00. Five deaths from small-pox are reported from New York city, and one each from the towns of Kinderhook and Saugerties, no other cases having developed in the latter localities. From typhus fever five deaths are reported from New York city and seven from Albany, where an outbreak has occurred in the county penitentiary. No returns are received for the month from Long Island City. For November 165 delayed returns have been received.

a Four of these in public institutions. *b* Besides eleven deaths in Soldiers' Home. *c* Besides six in public institutions.

SUMMARY OF MORTALITY OF THE STATE OF NEW YORK, FOR THE YEAR 1885, AS PUBLISHED IN THE MONTHLY BULLETIN.

Totals of Mortality in the several Sanitary Districts for the Year.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.
Maritime District	55,021	22,436	40.8	233	18	488	718	28	989	948	230	694	3,207
Hudson Valley District	8,941	2,668	30.0	86	7	249	95	3	63	109	25	48	580
Adirondack and Northern District	2,428	626	25.8	20	....	47	12	1	19	11	11	28	175
Mohawk Valley District	3,174	617	20.4	32	....	62	19	....	19	36	20	12	142
Southern Tier District	1,741	404	23.2	10	....	41	21	....	20	18	14	14	48
East Central District	2,444	537	22.0	26	....	48	21	1	10	14	11	8	80
West Central District	1,812	306	16.9	15	....	45	24	....	3	3	12	7	41
Lake Ontario and Western District	4,745	1,258	26.5	24	....	99	31	....	53	31	31	22	235

SUMMARY OF MORTALITY, ETC.—(*Continued*).

	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
Maritime District	5,828	243.20	8,036	7,896	648	2,813	3,095	2,863	5,252	1,087	1,989	2,909	5,056
Hudson Valley District	560	204.10	1,059	1,295	99	496	370	717	1,216	238	333	523	767
Adirondack and Northern District	113	180.00	268	359	38	149	84	209	253	66	89	217	269
Mohawk Valley District	183	168.55	366	456	41	185	111	263	452	99	115	293	268
Southern Tier District	97	161.40	195	199	31	132	51	145	253	68	86	135	163
East Central District	146	182.10	286	342	22	149	86	197	291	89	104	212	301
West Central District	90	132.45	196	281	22	138	85	167	275	58	80	218	152
Lake Ontario and Western District	286	170.90	460	617	73	280	189	337	658	177	198	390	555

SUMMARY OF MORTALITY, ETC.—(*Continued*).

Totals of Mortality of the State by Months.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.
January	6,571	2,163	32.9	42	2	92	64	....	127	177	29	58	443
February	6,606	2,284	34.3	40	1	52	70	....	126	154	41	53	412
March	7,391	2,561	34.6	40	....	60	71	....	135	180	63	67	352
April	7,016	2,275	32.5	31	....	68	75	1	141	191	44	56	326
May	6,542	2,094	32.2	53	1	55	74	....	122	165	38	47	319
June	6,204	2,483	40.0	37	1	54	74	3	106	128	32	46	319
July	9,318	5,066	54.4	41	2	61	89	4	89	97	14	77	284
August	7,284	3,405	46.7	43	1	104	103	....	67	28	19	123	260
September	6,251	2,306	37.0	35	....	145	110	5	39	10	12	98	314
October	5,680	1,853	32.6	27	4	151	85	5	53	6	15	61	429
November	5,448	1,620	29.7	25	2	126	69	8	77	17	19	53	478
December	6,096	1,913	31.4	32	12	99	60	7	112	17	28	95	572
Total	80,407	30,027	37.3	446	36	1,067	944	33	1,184	1,170	354	834	4,508

SUMMARY OF MORTALITY, ETC.—(*Continued*).

	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
January	104	111.20	1,078	1,028	93	329	371	404	691	148	165	425	7[illegible]1
February	89	125.37	1,396	929	95	302	338	437	712	149	190	456	564
March	113	146.08	1,684	1,083	118	329	368	481	812	165	200	467	603
April	106	132.55	1,441	1,049	94	347	395	487	761	81	236	522	564
May	136	154.70	1,038	1,033	94	331	345	407	707	161	312	387	717
June	680	238.55	643	814	78	334	328	432	703	172	277	356	587
July	2,983	401.37	464	883	107	612	348	392	1,052	172	375	413	759
August	1,719	337.31	419	895	54	430	307	347	675	192	267	366	875
September	839	241.08	475	886	59	412	316	358	651	137	271	398	681
October	324	204.22	525	927	58	342	313	362	603	160	238	341	651
November	115	181.85	716	831	63	302	310	388	619	158	249	353	470
December	93	185.42	985	880	61	273	330	408	665	192	214	405	556
Total	7,301	222.17	10,864	11,238	974	4,343	4,069	4,903	8,651	1,887	2,994	4,889	7,728

IN EACH 1,000 DEATHS THERE WERE IN THE—	From typhoid fever.	From diarrhœal diseases.	From croup and diphtheria.	From consumption.
Maritime District	8.87	10.60	58.28	143.51
Hudson Valley District	27.85	62.63	61.87	144.83
Adirondack and Northern District	19.35	46.54	72.08	147.82
Mohawk Valley District	19.53	57.65	44.74	143.67
Southern Tier District	23.55	55.70	27.57	114.25
East Central District	19.64	59.74	32.74	139.93
West Central District	24.78	49.67	22.63	155.08
Lake Ontario and Western District	20.85	60.00	49.53	130.00
The Entire State	13.27	90.80	56.06	139.76

For the entire State the ratio per 1,000 of deaths from all zymotic diseases to the total mortality in 1885 is 222.17, against 269.12 for nine months of 1884. This diminution, as will appear from the forthcoming report of the Secretary, is largely in typhoid fever and the diarrhœal diseases; the conjoined ratio per 1,000 from these diseases is 104.07, against 146.40 in 1884. As these are especially controlled by public hygienic improvements, this indicates the efficiency of the sanitary work that has been done, and is emphasized by the ratio of diphtheria, which depends largely upon domiciliary conditions, viz.: 56.06 per 1,000 total deaths in 1885, and 47.65 in 1884. These three typify the filth diseases. There is no material change in the other zymotic diseases.

Estimating the present population of the State at 5,400,000, an annual death rate of twenty per 1,000 would give 108,000 total mortality. The reported mortality with about 3,000 death reports received after the bulletin is issued, and the mortality of Buffalo, account for about 88,000 deaths. During the year about 5,000 more deaths were reported than in 1884, showing that more local boards are organized and that the returns are more complete.

REMARKS.— The SANITARY DISTRICTS into which the State is divided are as follows: *Maritime*, includes New York, Long Island, Staten Island and Westchester county. *Hudson Valley*, all the counties except Westchester on either side of the Hudson river, to the head of navigation, to and including Albany and Rensselaer. *Adirondack and Northern*, the northern section of the State — the counties of Washington, Warren, Hamilton, Essex, Clinton, Franklin, St. Lawrence, Jefferson and Lewis. *Mohawk Valley*, Schenectady, Schoharie, Saratoga, Montgomery, Fulton, Herkimer and Oneida counties. *Southern Tier*, the seven counties along the southern boundary. *East Central*, Sullivan, Delaware, Otsego, Madison, Chenango, Onondaga and Cortland counties. *West Central*, Cayuga, Tompkins, Seneca, Schuyler, Ontario, Yates, Livingston, Genesee and Wyoming counties. *Lake Ontario and Western*, Oswego, Wayne, Monroe, Orleans, Niagara and Erie counties. In the *Maritime* District, population 2,098,580 (census 1880), are the CITIES of New York, Brooklyn, Long Island City and Yonkers: in the *Hudson Valley* District, population 750,143, Albany, Cohoes, Troy, Hudson, Kingston, Poughkeepsie and Newburgh; in the *Adirondack and Northern* District, population 330,434, Ogdensburgh and Watertown; in the *Mohawk Valley* District, population 280,809, Schenectady, Amsterdam, Utica and Rome; in the *Southern Tier* District, population 365,746, Binghamton and Elmira; in the *East Central* District, population 351,320, Syracuse; in the *West Central* District, population 321,247, Auburn; in the *Lake Ontario and Western* District, population 578,705, Oswego, Rochester, Lockport and Buffalo.

[This circular with the accompanying No. 38 of the Board, was sent to border town boards as soon as danger of approach of small-pox from Montreal became threatening.]

STATE BOARD OF HEALTH OF NEW YORK..

ALBANY, *October* 8, 1885.

To the Health Officer of :

DEAR SIR — Be kind enough to bring to the notice of your board of health the desirability of passing and enforcing the following resolution:

"Until further notice from this board, no person shall be permitted to enter this (town or village, as the case may be) without satisfactory evidence of recent vaccination, if coming from Canada, or other places where small-pox is known or believed to exist."

Personal baggage or articles liable to convey contagion from infected places should also be refused admission until disinfected.

Faithfully yours,

ALFRED LUDLOW CARROLL, M. D.,
Secretary.

[No. 38.]

STATE BOARD OF HEALTH OF NEW YORK.

PREVENTION OF SMALL-POX.

Duties of the Local Authorities — Health Officers and Others.

SMALL-POX IS LIABLE TO APPEAR IN ANY PLACE where there are unvaccinated persons. It is dangerous to life, and is a misfortune which causes loss and great disturbance in the affairs of any community that does not immediately secure to every inhabitant the necessary protection by **vaccination** and **re-vaccination**, and by thorough quarantine and disinfection of the contagion.

The Laws in this State require:—

(1.) That all who are in attendance at the public schools shall present evidence of their having been vaccinated; also that after ten days' notice any person may be excluded from school who is not so protected against Small-pox. (Chap. 438, Laws of 1860.)

(2.) That it shall be the duty of all local Boards of Health promptly to report to the State Board of Health every case of Small-pox, and to immediately provide thorough and safe vaccination for all persons who need the same, within the jurisdiction of said local Board; also to isolate and keep in quarantine, and to regulate, prohibit or prevent communication or intercourse with persons, houses and places that have Small-pox.

(3.) That the local Board of Health shall suitably provide places and means for the complete separation and sanitary care of infected persons and things. [See Circular No. 27: "Contagious Disease Refuges."]

VACCINATION IS A PUBLIC DUTY for the protection of the whole community as well as of each individual and family; and it is so necessary to secure its protection in all places and for all classes of people that **none have a right to neglect it for them**selves, their families, the public schools or the community. The State Board of Health has directed its Secretary to give whatever information or advice is needed to secure the most perfect vaccine matter and the speediest and best application of it whenever and wherever it is required.

THE STATE BOARD ADVISES and requires that the law for **vaccination** of **all** who attend school shall be faithfully observed; and

That every local Board of Health be prepared against Small-pox,—

By an agreement with all physicians to secure perfect vaccination in every household where they attend:

By instructions to Health Officers to ascertain who are unvaccinated and exposed:

By notifying the State Board of Health at once, when and where Small-pox appears; and,

By requiring prompt compliance with the local Board's orders, and by immediately instructing and aiding the community in regard to the same.

A WORD OF SUGGESTION AND WARNING TO ALL. Every infant should be vaccinated before it is six months old, unless a good physician advises to the contrary.

the fact of complete protection against Small-pox; and those who have had that disease should be vaccinated, as it may attack a person who was marked by it, as well as a person who has been only once vaccinated. **Sufficient vaccination removes all liability** to the disease. For this purpose **re-vaccination is earnestly advised.** Vaccination with lymph from clean and healthy inoculated heifers causes no disease. It can be obtained fresh every day from perfectly healthy calves, and within a day or two can be at hand for use in any town in this State, at a cost of from six to twelve cents for each "slip" or "point." The Board of Health in each of the cities is earnestly requested to keep such a supply of *vaccine* at hand that it can instantly meet any exigency, or furnish a neighboring community with a few points of the lymph at cost. It should be inserted by physicians only, and they should examine the result at the end of seven days.

What to do when Small-pox occurs: —

(1.) Place the sick in a separate room from which all clothing, carpets, upholstered stuff and the quilts and feather bedding have been removed beforehand. In such a room with open windows and an open fire, keep the sick and nurses entirely separated from all other persons until the Doctor and Health Officer take charge. Then follow their requirements.

(2.) Let all persons who are near the sick be immediately vaccinated afresh, and let it be understood from the first that all bedding, clothing, towels and cloths which are touched or used by the sick shall be burned if they cannot be otherwise satisfactorily disinfected; and every place where the sick are, where there is anything that has come from or been exposed to them, shall be thoroughly disinfected as soon as possible.

(3.) A separate place, or even a hut constructed for the purpose, should be so prepared as to be safer for the sick than any ordinary dwelling rooms; that is, that the fresh air and sanitary care and nursing shall be the best possible; and that it shall be an apartment and locality from which the contagion will not be spread abroad.

(4.) No delay or objection should prevent the vaccination of all persons who have been in any manner exposed, or suspected of exposure, to the contagion. If fresh vaccine is not at hand, the physician, or the Health Officer should telegraph to the nearest person who can supply it. If that request is not immediately complied with, then telegraph to the State Board of Health, or to Dr. J. B. Taylor, Health Department, 301 Mott street, New York.

(5.) In case of death, wrap the corpse in a sheet saturated with the strongest disinfectant, and bury it in a deep grave within twenty-four hours, and without a public funeral.

Among the disinfectants easily attainable are: —

For clothing, bed linen, etc. — Sulphate of zinc and common salt, dissolved together in water in the proportion of four ounces of zinc and two ounces of salt to the gallon. Two parts of carbolic acid and one part of fresh chloride of lime to a hundred parts of water.

Boiling for half an hour affords efficient disinfection.

For discharges, utensils, corpses, etc. — Five parts of carbolic acid and four parts of chloride of lime to one hundred parts of water.

For privies, sewers, outhouses, etc. — The stronger solution of carbolic acid and chloride of lime, or chloride of lime in powder.

Sulphate of iron (copperas), two pounds to the gallon of water.

Reliance should not be placed upon any of the secret proprietary disinfectants

For fumigation. — Roll sulp[illegible] a tub containing water] in th[illegible]
[illegible] of three pounds for [illegible] bic feet of space; the room [illegible]

SPECIAL RECOMMENDATIONS.

The State Board of Health recommends that in whatever city, village or town Small-pox appears, the entire neighborhood in which there has been any communication with the patient, or exposure to the contagion, shall be notified that the *State Board as well as the local Board of Health requires that every person shall be protected by Vaccination;* that whatever materials are infected shall be destroyed by fire or shall be kept in a disinfectant solution and be boiled without removal from the premises; that rooms and furniture suspected of contagion shall be fumigated with sulphur as directed by this Board's rules; that tramps and other persons suspected of infection with Small-pox shall be taken in charge by the police and the sanitary authorities; that **employers shall advise their companies of employed persons to be vaccinated;** and in case of Small-pox in their vicinity, to make such vaccination one of the conditions of being continued in employment. This rule should be strictly enforced in all manufactories that make goods which are liable to become infected, and especially should be a standing regulation in public houses and in all classes employed on railroad trains and passenger vessels.

FORM OF REPORT TO THE STATE BOARD OF HEALTH AND TO THE LOCAL BOARD.

(Name and age)

.... is sick with Small-

(Name of house and place)

pox (or varioloid) at.. ... The

(Date)

eruption began..... ....

It is believed the contagion was taken at............. ....

by exposure to.......... ....

Number of Persons now exposed to Patient............

Who has the responsible care and custody of the case? ....

(Signed)........ ....

(P. O. address)................ ....

REQUEST: ______________________________

____

Such a notice, with the request that needs to be made, should be sent to the Health Officer or the nearest member of the local Board of Health. If the physician is already in attendance, he should sign it; but if no physician has reached the patient, the householder and any other person that has charge of the case should sign this first report and request, and send it to the family physician or to the Health Officer. The physician who first sees the case, or the Health Officer, should write out such a brief report and his own request, and send it by mail to the Secretary of the State Board of Health.

MEMORANDUM OF RULES TO BE ADOPTED TO PREVENT THE SPREADING OF CONTAGIOUS DISEASES IN SCHOOLS.

The following sanitary rules are recommended by the State Board of Health for adoption by all School Boards and Trustees. They are presented in a form suited for direct transfer to the Public School Regulations, with the exception of the bracketed [ ] portions, which may depend on local circumstances for their application or feasibility:

I. Every person entering the public schools of .... must give satisfactory evidence of protection against Small-pox, or be excluded until the rule is complied with, as provided by the Statute of 1860. [See synopsis of this Statute as appended.]

II. The fact of vaccination and protection should be entered with each name on the school record [and on transfer or promotion lists, so as to avoid further inconvenience to the pupil].

III. Persons affected with Diphtheria, Measles, Scarlet Fever or Small-pox, must be excluded from school until the School Officers' permission is granted.

IV. Intercourse between the school and family or house where there is a case of any one of these contagions, must be forbidden until the official permission is given.

V. It will be the duty of every teacher and school officer who discovers a case of any of these contagious diseases to cause the fact to be immediately reported to the local Board of Health. [The Board of Health should assume the sanitary duty of quarantining and disinfecting, as well as that of permitting the pupil's return, etc.]

VI. If a child is ascertained to have attended school while affected with any of these contagions, the local Board of Health shall be requested to direct the proper disinfection of the school premises. In the absence or delay of such sanitary authority, the physician in attendance, with one of the school officers, should direct this duty in accordance with the Rules for Disinfection and Cleansing given by the State Board.

VII. Rule III must invariably include all persons from the family where the case of sickness exists. [It should extend, also, to all persons living in the same house at the discretion of the local Board of Health.]

VIII. [It is desirable that all cases known to the Board of Health should be at once reported to the school authorities; and the latter should request the Board of Health to do so; and every teacher and school officer not only should promptly inform the Health authorities of each known or suspected case of contagious disease, but should endeavor to have the sanitary rules enforced, and give proper information to the families concerned.] In such instances the duties of all these officers and persons are reciprocal, and none can prudently be neglected.

SYNOPSIS OF THE STATUTES RELATING TO CONTAGIOUS DISEASES IN TOWNS AND SCHOOL DISTRICTS.

The Statute (chapter 438, Laws of 1860) makes the following provisions:

1. The trustees of school districts, and the school boards, are empowered to exclude from the public schools all unvaccinated persons until they are vaccinated.

2. This power may be exercised by trustees or boards, after passing a resolution to that effect, and posting a notice for at least ten days in two or more conspicuous places within the limits of their respective school-board or district organizations. Such notice should offer free vaccination to those unable to pay.

3. The trustees or Board are further empowered to employ and pay a physician, who shall make a list of all persons within the school ages that have not been vaccinated, and provide with certificates of vaccination those persons whom the said trustees or Board directs. [The local Board of Health is required, under chapter 270, of 1885, to supply all the necessary means for gratuitous vaccination, and it is declared to be its duty *to make all needful provisions for immediately obtaining the necessary means for thorough and safe vaccination of all persons within the said jurisdiction who may need the same.*]

4. The amount expended is to be included in the annual tax bill. [The new law enables the town, village or city to meet the expense by its local Board of Health.]

5. The trustees of school districts are required to include in their annual report the number in their several districts between the ages of five and twenty-one who are vaccinated, and the number not vaccinated. [Every local Board of Health should require compliance with this law.]

STATE BOARD OF HEALTH OF NEW YORK.

ALBANY, , 188 .

To the President of the Board of Health of :

At a recent meeting of the Civil Service Commissioners, the following resolution was adopted and transmitted to this office:

"That inasmuch as only a limited number of health officers has been appointed and examined under the civil service rules, and the necessity for promptly filling all of those positions seems to be urgent, and the State Board of Health appears to be the proper body to take the initiative; therefore the Civil Service Commission respectfully requests the State Board of Health to urge all local health boards to take immediate steps for the appointment of qualified health officers in all localities where appointments have not already been made."

In pursuance of the above request, I beg to notify you that your board is required to forward to the office of the Civil Service Commission, at Albany, the name and address of the person chosen by you for the position of health officer, in order that arrangements may be made to determine his competence.

Under the civil service rules, your board can either name one physician for non-competitive examination, or two or more for competitive examination. No appointment otherwise made is valid.

ALFRED LUDLOW CARROLL, M. D.,
Secretary and Executive Officer.

ꟻFLUVIUM NUISANCES.

EFFLUVIUM NUISANCES.

; committee on effluvium nuisances submits the details of the
undertaken by it during the past year. A careful surveillance
he operations of the factories on Barren island and Newtown
has been maintained, and special investigations made in re-
; to petitions. A great mitigation of the offensive effluvia was
d during the summer by the suspension, during the warm
is, of the super-phosphate works of Messrs. Coe & Co.
omplaint was received from Sheepshead Bay on the 8th of June
effect that the drainage from the hotels at Sheepshead Bay
oney Island was rapidly filling up the bay and polluting the
and wells. This being properly a local matter, the communi-
was referred to the local board of health for examination. A
ıll return was made by the local board, which shows their
ability to deal with the question.
the 10th of June petition was received from citizens of Brook-
mplaining of a nuisance from Newtown creek. The subject
lled to the attention of the board of health of Newtown. A
inspector was also sent to look into the merits of the com-
He found that the nuisance was caused by a large quantity
h bones that were allowed to be exposed to the air and flies,
so to pouring into the air of gases from the retorts in which
nes are distilled. Remedies were suggested by the inspector,
promise secured that the nuisance would be abated.
condition of the factories on the island is shown in the in-
r's report dated July 2d. Various improvements were noted:
el's super-phosphate works had suspended for the summer
e. The open platforms for the storage of fertilizers had been
ed by suitable sheds and a general cleaning up had been
d. The only serious nuisance then remaining arose from the
in transferring loads of dead animals from the boats to the
g vats. This can only be overcome by the quick handling
h material on its arrival.
ector Bartley, under date of August 14th, notes the improved
ion of the factories, and the abatement of a nuisance in the
urning establishments of Mr. C. Meyers, Jr., and Messrs.
r & Co., caused by an abortive attempt to destroy the gas from
retorts, in which the bones are charred, by conducting it into

the main chimney. The remedies suggested were the forcing of the gas into the fire by means of a steam aspirator. This method was adopted with success.

Inspector Hollick, in noticing the transformation wrought on the island by the constant supervision of the board's inspectors, says that a visitor would hardly recognize the island to-day as the same place it was five years ago. Later, on October 20th, it was found that Moller had discovered that the method of disposing of the residual gases, by conducting them into the furnace as above noted, cooled the fires, and a change was effected whereby the gases were conducted behind the fire, where they were not consumed. The old nuisance was again felt. The opinion of the Attorney-General was sought as to how Moller might be forced to abate the nuisance. A decision was rendered to the effect that the local board of health of the vicinity had ample power in the premises. The inspector, however, obtained the promise from Mr. Moller that he would introduce certain specified improvements which would secure the desired end, so that a resort to a legal remedy was rendered unnecessary for the present.

The pollution of Newtown creek by the sewage of a portion of the city of Brooklyn, and by the discharge into it of more or less of the tarry wastes from the factories situated along its banks still remains. The proposed new sewer for Brooklyn, however, is expected to work a vast improvement in this respect. On the whole, it is gratifying to the committee to note the success of its efforts during the past year, and to witness the vast results accomplished since the committee was first appointed.

The chairman of the committee on effluvium nuisances, in regard to Barren island, against which complaints have been made, requested the inspector, Mr. Arthur Hollick, to visit and examine the six most offensive establishments upon the island and to report to him, for the information of the State Board of Health, the result of his investigations. Mr. Hollick's report will be found annexed.

The chairman also visited in person the proprietors of the leading manufactories and contractors, causing and producing the offenses on Barren island, of which complaints in past and present time have been made, and has requested them to put upon record the precise work in which they were engaged and in regard to which they were assured that the spirit and letter of the State Health laws would be observed and proper performance of work would be exacted by the Board in the common interest of the people upon the island and the community at large. The communications, as far as received, will be found annexed.

Mr. Coe promises to suspend his work during the warm months of this year.

ERASTUS BROOKS,
Chairman.

APPENDED DOCUMENTS.

STATE BOARD OF HEALTH OF NEW YORK,
BUREAU OF CHEMICAL ANALYSTS,
NEW BRIGHTON, *June* 3, 1885.

HON. ERASTUS BROOKS:

DEAR SIR — According to your instructions I have this day visited Barren Island. The small steamboat that plies between the island and Canarsie is running four trips per day, but is to be taken off next Tuesday for repairs, and will not resume for about ten days from that date.

I ascertained that Mr. Harrison is the public school teacher on the island, which is included in the town of Flatlands.

The date of my detailed report upon Barren Island is October 31, 1884, to which I would respectfully refer you for general information. The following memoranda in regard to the six establishments located there were taken to-day:

COE'S FERTILIZER WORKS.

E. Frank Coe, 16 Burling slip, promised last autumn that they would cease mixing this summer as during previous summers. Have as yet obtained no hint in regard to the matter. April 2d, of this year one of the boilers blew up, killing two men and wrecking part of their plant; the resulting fire was put out by the copious use of "sludge acid," which has left things in a rather poor condition.

WHITE'S OFFAL RENDERING WORKS.

P. White's Sons, 41 Peck slip. The only change made has been to build a shed for the storage of their meat scrap. This is in the nature of an improvement, as it prevents the scrap from being acted upon by sun and rain. As they still have the contract for removing the dead animals and offal from New York city I suppose that their establishment will be the same inevitable nuisance that it always was.

STEINFELS' FERTILIZER WORKS,

B. Steinfels, 182 Front street. All their work is done in the open, on exposed platforms and is certain to be very offensive in hot weather. It would be well to insist upon adequate cover being provided, in the form of sheds, for the proper storage of their material. I understand that it is proposed to enlarge the business considerably this year. Hawkins and Friedlaender's fish factories remain exactly the same as when I reported last autumn. Fishing was commenced this year on the 18th of May.

McManus' establishment is in the nature of an experiment station. It is a small plant, consisting of a boiler and still. Last year Mr.

McManus experimented upon sludge acid — trying to distill an oil from it. This year he is engaged in distilling offal, trying to make sulphate of ammonia. The entire place is too small to be of any consequence.

The three first named are the ones from which most of the offense arises. Of these Coe will probably cease mixing during the summer. White has already ceased, and Steinfels has done nothing whatever toward lessening or removing the nuisance he creates.

Very respectfully yours,
ARTHUR HOLLICK.

NEW YORK, *June 8*, 1885.

Hon. ERASTUS BROOKS, *West New Brighton, Staten Island, N. Y.*:

DEAR SIR — For the past five years we have endeavored to conduct our business upon Barren Island in such a manner as to be the least nuisance possible to any one, and especially during the summer months, and to that end we have stopped the objectionable portion of our works for that time, at great expense to us. This year we shall stop as usual, which we trust will be satisfactory to your honorable Board.

E. FRANK COE,
J. D. FAIRCHILD.

NEW YORK, *June* 12, 1885.

Hon. ERASTUS BROOKS, *State Board of Health*:

DEAR SIR — In answer to your inquiry concerning our method of disposing of the dead animals, butchers' offal, etc., received by us under our contract with the city of New York, we would state: All the dead animals, butchers' offal, etc., are removed daily at nine A. M., from our dock foot of West Thirty-eighth street, by steamboat to Barren Island, where they are unloaded within one hour after arrival, and by six P. M. of same day the entire load is disposed of in steam-tight tanks. Our entire factory is thoroughly sprinkled with disinfectant three times each day, the cutting-up floor flushed and washed down, and all the offal boxes and barrels in which the offal is received are disinfected and whitewashed before returning them. The material we handle is a nuisance before we receive it, and our best endeavors are directed to remove and take care of it in the least offensive and objectionable manner.

Very respectfully,
P. WHITE'S SONS.

To the State Board of Health, Albany, N. Y.:

The undersigned, citizens and tax payers of the city of Brooklyn, several of whom were your petitioners a year ago, desire again to call your official notice to the vile and nauseating odors which pervade that portion of the city, coming from the bone-boiling and bone-burning

establishments, just outside the city limits, at Newtown creek and Grand street.

Upon your official order, June, 1884, the matter of our complaint was referred to the chemist of your honorable Board, and he was satisfied, and reported accordingly, that the stenches came from the source already mentioned.

During the winter the unpleasant smell was not so frequently noticeable, but of late, when the wind is from a north-easterly direction, the odors are disgusting in the extreme. Probably several hundred thousand persons are annoyed, and many injured in their health from this cause. During the evening and night the smell is so intolerable as to necessitate the closing of windows, which seriously interferes with proper ventilation.

There is reason to believe that many families had supposed these noxious odors to arise from defective plumbing in their dwellings, and have been put to needless and unavailing expense in their attempts to escape the annoyance.

If this nuisance is allowed to continue, it will render a very considerable portion of the city undesirable as a place of residence, and thereby greatly depreciate the value of real estate in a neighborhood which is rapidly growing in population and wealth, and now gives promise of more rapid growth from increased facilities of rapid transit, arising from the completion and opening of the Brooklyn Elevated railroad.

In view of the fact that we have long suffered from the cause already described, and fearing the near future may bring to us fatal epidemic of disease, we respectfully petition that your honorable Board give the matter immediate attention, and that, if necessary, you invoke the aid of the chief executive of the State in *promptly* and *permanently suppressing* this *terrible nuisance*.

Dated BROOKLYN, N. Y., *June* 10, 1885.

Walter B. Chase, M. D., 636 Willoughby avenue.
J. A. McCorkle, M. D., 149 Clinton street.
Lewis R. Foote, 523 Willoughby avenue, Pastor of the Throop Avenue Presbyterian Church.
Thomas J. Atkins, 631 Willoughby avenue
T. C. Packer, 100 Sumner avenue.
Darwin R. James, 282 Throop avenue.
George R. Howler, M. D., 457 Marcy avenue.
J. Hyatt Smith, 109 Hart street.
Alexander Hutchins, M. D., 796 DeKalb avenue.
Henry Heath, 142 Macon street.
George M. Nichols, 277 Adelphi street.
W. C. Bowers, 483 Washington avenue.
George G. Collins, 301 Throop avenue. } *Aldermen.*
R. L. Scott, 897 Greene avenue.
John M. Quintard, 431 Greene avenue.
Hosea O. Pierce, 655 Willoughby avenue.

Ira C. Cook, 691 Willoughby avenue.
Robert Henderson, 686 Willoughby avenue.
Henry A. Phillips, 843 Willoughby avenue.
B. W. Bradley, 503 Willoughby avenue.
N. J. Gates, 636 Greene avenue.
Philip Krieger, 896 Myrtle avenue.

DURHAM, N. Y., *June* 12, 1885.

To whom it may concern:

My house is at 523 Willoughby avenue, Brooklyn, N. Y. I was confined to my room by reason of severe illness for seven weeks, beginning April 20. Frequently during the month of May, beginning at night-fall, the stench coming from the nuisance complained of was so great, the air was so offensive and stifling, as to cause positive discomfort; on this account I was compelled on a warm summer night, in the confined air of a sick-room, to raise the question of closing the windows to escape this foul odor that would otherwise fill my room.

LEWIS R. FOOTE,
Pastor Throop Avenue Presbyterian Church.

June 20, 1885.

A. L. CARROLL, M. D., *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR — I send you by this post, under another cover, a petition asking your honorable body to take immediate steps to suppress the nuisance of bone-boiling and bone-burning at Newtown creek and Grand street.

The community feel that they are entitled to relief, and confidently appeal to you for it, desiring, so far as consistent with the proper conduct of your affairs, that you keep us informed as to what you are doing in the premises.

I have no reluctance in saying that the gentlemen who have signed the petition are among the leading citizens of the city. Representing the medical profession is Dr. Alex. Hutchins, late president Medical Society State of New York, Dr. James A. McCorkle, president Medical Society county of Kings, and Dr. George R. Fowler, surgeon to St. Mary's Hospital. Hon. Darwin R. James, M. C., and Rev. J. Hyatt Smith, late M. C., General Henry Heath, member of Assembly from this district, John C. Cook, late president New York Metal Exchange, Supervisor L. W. Beasly, and five of the aldermen of the city, together with Mr. H. O. Pearce, Rev. L. R. Foote and other gentlemen, several of whom represent large financial and commercial interests.

You will understand the annoyance sick people suffer, from the letter of Rev. Mr. Foote; the truth is the stench is so intolerable that well people are frequently at night compelled to close their windows.

Many other names could have been added to the petition, but with the knowledge you already possess, it seems all that is needed is *action* on the part of *those in power*, to whose *just* and *prompt action* we appeal.

Hoping for an early acknowledgment, I am, sir, yours truly,

WALTER B. CHASE.

P. S.— You have probably received from Dr. Raymond, health officer of the city, before this date, a letter setting forth his views of the needs of the situation.

W. B. C.

INSPECTION OF NEWTOWN CREEK.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *June* 30, 1885.

To the Supervisor of Newtown :

DEAR SIR — Some days ago a petition was received at this office from a large number of influential citizens of Brooklyn, complaining of alleged nuisances emanating from bone-boiling and bone-burning establishments, just outside their city limits, at Newtown creek and Grand street.

In response to this petition Dr. Bartley has been deputed by this Board to verify the causes of complaint, but as the matter lies within your jurisdiction, I trust that your board will co-operate with him in an investigation, and, if nuisances be found to exist as represented, that you will take prompt measures for their abatement.

Faithfully yours,

ALFRED LUDLOW CARROLL, M. D.
Secretary.

BROOKLYN, N. Y., *July* 2, 1885.

Dr. ALFRED L. CARROLL :

DEAR SIR — In accordance with your instructions, I visited the region along Newtown creek in company with one of the complainants of this city, who identified the odor complained as that produced by Mr. Meyer's and Mr. Moller's fertilizer works.

After consultation with the complainants, by appointment, I thought this the best plan to fix the location of the offending parties. I find two causes for the nuisance complained of, viz. : A large quantity of fresh bones allowed to lie exposed to the air and flies for weeks; also, the pouring into the air of the gases from the retorts in which the bones are distilled. These gases are, in my opinion, the chief source of the trouble. After passing the gases through condensers, such as are used in ordinary gas-houses, they are forced through a tank containing sulphuric acid to collect the ammonia. They are then conducted through a long flue to the chimney, which they enter at about ten or twelve feet above the fire. This is evidently an ineffectual attempt to burn the gases.

At my suggestion, both these gentlemen promised to so change the apparatus as to force these residual gases into the fire itself, and thus completely consume them. By the aid of a steam blower this can be done with very little expense, and they signified their entire willingness to make the change immediately. I have already communicated the result of my visit to the complainants, and I have no doubt that the trouble can be remedied without any other action than our advice. They also promised to remove the bones spoken of above, and hereafter to work them up as they come in. I shall make another inspection as soon as convenient, and report to you the results.

Very respectfully yours,
E. H. BARTLEY, M. D.,
Inspector.

DRAINAGE AT SHEEPSHEAD BAY.

SHEEPSHEAD BAY, *June* 6, 1885.

To the Honorable Board of Health:

DEAR SIRS — Your attention is respectfully called to the drainage at Sheepshead Bay, and also to the Manhattan Beach and Oriental hotels' artesian well, or water supply at this place. The New York *Herald* has had a communication from me in reference to this subject for one month, but for some unseen reason hesitates to publish the same. The drainage from the hotels at Sheepshead Bay and Coney Island is rapidly filling up the bay, and polluting the lands and wells surrounding it, and if something is not speedily done in reference to the matter, disease and ruination stares this place in the face. The local board of health seems powerless, except so far as expensive sewerage is concerned, which, in case of our acceptance of the same, they have given us to understand, that we can sewer in the bay contrary to law, and the complaints, if any are made, can be referred to them. I inclose a communication from one of the *Herald* staff which will give you some idea of the existing state of affairs, he having engaged rooms at the St. Elmo, and properly canceling the engagement after personally inspecting Sheepshead Bay, thereby backing up, as he says, their reporters' own views. The Manhattan Beach water supply, or artesian well, is surrounded with water-closets and sink-drains, twelve of which belong to tenement and store property, and these are as close as seventy-five feet, and all within 150 feet of the pump, which supplies Manhattan Beach and Oriental hotels.

Yours respectfully,
E. A. MASON,
St. Elmo Villa, Sheepshead Bay, L. I.

On June 8, a copy of the above complaint was forwarded to the local board of health and a report of the facts asked for.

Return made by the Local Board of Health.

GRAVESEND, N. Y., *July* 23, 1885.

To the Honorable, the State Board of Health at Albany, N. Y.:

GENTLEMEN — Concerning the charges against the health of Sheepshead Bay and Manhattan Beach water supply, the Health Officer, R. L. Van Kleek, has made the following report with analysis attached:

To the Honorable Board of Health, Gravesend, N. Y.:

GENTLEMEN — The complaint of E. A. Mason, forwarded to you by the State Board of Health and referred to me at your last meeting for investigation and report, has received consideration, and I would respectfully submit the following report for your consideration and action.

The complaint alleges: First, that the drainage from the hotels of Sheepshead Bay and Coney Island is rapidly filling up the bay; and, secondly that the water supply of Manhattan Beach is rendered dangerous by being surrounded by water-closets and sink drains; twelve of which belong to tenement and store property, and these are as close as seventy-five feet, and all within 150 feet, of the pump which supplies the Manhattan Beach and Oriental hotels.

The first allegation is evidently made without any examination whatever into the facts of the case by the complainant, and will be dismissed with a very few words.

I have at different times within the last few years, and as lately as June 1, made personal inspections of nearly all the sewers emptying into the bay, and I have failed to find one instance when solids are allowed to run therein; and neither has a single complaint prior to the present one been made within the last two years in reference to this subject.

The second allegation has involved not only an inspection of all the privy vaults and cess-pools within 200 feet of the wells referred to, but also a chemical analysis of the water.

The distance of these water-closets and cess-pools from the wells is as follows:

The nearest water-closet is 50 feet; the next is 90 feet; the third is 100 feet; the fourth is 115 feet; the fifth is certainly 150 feet; the sixth, 200 feet.

The nearest cess-pool is 140 feet distant, the second cess-pool is 166 feet; the third is 186 feet; so within 75 feet we have but one water-closet instead of twelve, as alleged by the complainant, and within 175 feet we have four additional ones, besides two cess-pools.

All these vaults and cess-pools are, at present time, in good condition, and I find no violations of your regulations in regard to them.

The wells supplying the beach are situated on the east side of the railroad track ; the first one is 30 feet north-east of the pump-house; the tenth one and last is distant 287 feet in the same direction ; they are constructed with special reference of preventing contamination in the most approved manner, and are all 30 feet deep. When they were constructed there was not a single dwelling within 1,000 feet, and the company had no reason to suppose that there would be a dwelling near them for a long period of time. But within the last three years about twenty-five buildings have been erected within 500 feet of the pump-house, and it is possible that each year will see more buildings erected in this locality. All these buildings and in fact all Sheepshead Bay village, containing in the summer season 2,500 individuals at least ; are supplied with water from wells half a mile to the north, and pass through the ordinary size iron pipes. The supply is unlimited, but there is no corresponding sewerage, and this will make soil-saturation with decomposing waste absolutely certain.

As the complainant refers to the health of Sheepshead Bay that it is threatened, let me call your attention to the following facts: During 1884 there was one death on Manhattan Beach, and this was due to heart disease, and but one death at Sheepshead Bay that could even indirectly be attributed to disease contracted through filth, and probably the disease was contracted elsewhere than in this village. The ratio of deaths to the population is no larger here than in any other district of the town.

To conclude, I would report: First, that the bay is not filling up by drainage from the hotels of Sheepshead and Coney Island ; second, that the water supply to Manhattan Beach is not contaminated, as shown by analysis. I would recommend, however, the removal of the wells within 200 feet of cess-pools and vaults to a point further distant to prevent any possible contamination in the future, and I would recommend some system to carry off the water caused by a liberal water supply to prevent soil-saturation.

Respectfully,

R. L. VAN KLEEK,
Health Officer.

Since writing up the above report I have been informed that the Manhattan Beach Improvement Company intends, this autumn, to remove their wells to a point distant about one-fourth to one-half of a mile north of their present location.

R. L. VAN KLEEK.

NEW YORK, *July* 2, 1885.

Result of analysis of a sample of water marked "Manhattan Beach Supply," drawn and sealed by our agent, June 30, 1885, at Sheepshead Bay :

	Grains in U. S. gallon.
Odor when heated to 100 degs.	none
Chlorine	2.188
Phosphoric acid	trace
Nitrogen in nitrates	.020
Free ammonia	.001
Albuminoid ammonia	.002
Hardness	5.500
Total solids	8.750
Organic volatile	3.500
Mineral	5.025

According to chemical standards the water is a good drinking water.

Respectfully,
STILLWELL & GLADDING,
Chemists to the New York Produce Exchange.

The following resolution was then adopted, to-wit:

Resolved, That the report of the health officer be received, and that the secretary of this board be directed to forward a certified copy of the report to the State Board of Health, at Albany, N. Y.

Adopted July 2, 1885.

I, John L. Voorhies, secretary of the board of health of the town of Gravesend, county of Kings, State of New York, hereby certify that the within is a true copy of a report from the health officer of said board of said town, presented to the board at a meeting of said board held July 2, 1885, as the same appears upon the minutes of the proceedings of said board.

[L. S.] JOHN L. VOORHIES,
Secretary of the Board of Health and Town Clerk of Gravesend, N. Y.

INSPECTION OF BARREN ISLAND.

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *July* 2, 1885.

The inclosed report from Mr. Hollick shows the condition of affairs at Barren Island at the present time. It was the opinion of the committee that the manufacturers were endeavoring to comply with the previous recommendations of the State Board of Health in carrying on the business in as inoffensive a manner as possible.

J. SAVAGE DELAVAN, M. D.,
Chairman.

NEW BRIGHTON, N. Y., *June* 30, 1885.

J. SAVAGE DELAVAN, M. D., *Chairman Committee on Effluvium Nuisances:*

SIR — According to instructions from you I beg leave to submit the following memoranda noted during our visit to Barren Island, to-day:

At Mr. E. Frank Coe's fertilizer works, all operations, except shipping the finished material, had ceased. The sludge acid tanks were empty, and the manager, Mr. Fairchild, stated that the last mixing had been done on the twentieth instant, when the works were shut down for the summer. The factory is now in process of "cleaning up" and work will not be resumed until September, according to Mr. Fairchild's promise. This I understand is done voluntarily, with the desire to avoid any nuisance that might arise during the hot weather from the souring of sludge acid.

The fish factory of Hawkins Bros. was working at almost its full capacity. The present season has not been a good one for curing the fish, as there has been but little clear hot weather; in this business the main desideratum is sunshine, and but very little nuisance will arise if the scrap is quickly cured.

The fertilizer works of B. Steinfels were in better condition than at any previous time since the works were started. Last summer all work was done on open platform, and the material was piled in heaps in the open air. My visit to the island on the third instant seemed to have a good effect, for sheds have been erected in which to store the fertilizers, and Mr. Steinfels has followed Mr. Coe's example in regard to stopping work during the summer; he says that his last mixing was done on the tenth instant, and that he does not intend to resume until September; the annexed letter in regard to the matter will explain itself.

At White's offal rendering place, every thing was as clean as possible, but the inevitable nuisance was apparent when the boat arrived with its load of dead animals, etc.; the worst effects are felt while the load is being transferred from the boat to the cooking vats, and every thing should be done to facilitate quick handling of the material as soon as it arrives. The fish factory in connection with it, also Friedlaenders' fish factory, were in about the same condition as Hawkins Bros.' It is to their advantage that all fish scrap shall be well cured, as wet or sour scrap will breed insects, besides being liable to spontaneous combustion if mixed with dry scrap and stored in bulk in a hot place.

In conclusion I would state that the general condition of the island and its industries is far better, from our point of view, ***than at any time during last summer***, and if the responsible parties continue to act during the summer in good faith, as they seem to intend doing, there will be no very serious cause for complaint.

Very respectfully, etc.,

ARTHUR HOLLICK,

Inspector.

NEW YORK, *June* 25, 1885.

Mr. A. HOLLICK:

DEAR SIR — We have noticed your complaint in the Brooklyn *Union*, which states that the work is done on the platform; such has been stopped since June 10th. We have finished our manufacturing of fertilizer for this summer, and have it all ready in sheds for shipment to our trade. You will find every thing to your entire satisfaction, and we try to have every thing clean and nice.

Yours very respectfully,

B. STEINFELS,

Manager.

Per E.

BROOKLYN, *August* 14, 1885.

Dr. ALFRED L. CARROLL, *Secretary State Board of Health:*

DEAR SIR — Some weeks ago I had the honor to submit to you a preliminary report upon the nuisances created by certain factories, situated on Newtown creek. In that report I stated that I believed the odors came from the bone-burning establishments of Mr. C. Meyer, Jr., and Messrs. Moller & Co. Further examination and repeated inspections have confirmed that opinion. The owners of these factories had made an attempt to destroy the gases from their retorts, in which the bones are charred, by conducting them into the main chimney; this was soon demonstrated to be ineffectual, as the gases were poured into the chimney ten or twelve feet above the fire-box in both factories. I then requested them to try the method of forcing the gases into the fire direct, by means of a steam aspirator. After considerable delay, owing in part to my absence from the city for a few weeks, my suggestion has been carried out, with the effect, it is hoped, of entirely destroying the odors heretofore complained of.

Another cause of considerable odor has also been remedied, viz.: the practice of allowing the fresh bones, after being boiled to remove the fat, to lie in a pile for weeks at a time. These piles, at the time of my first visit, were very offensive, and were found in large quantity. This practice has been stopped and the bones are now separated from the meat at once, and worked up as soon as they can be dried sufficiently. With these improvements, the odor has been reduced to the minimum, and I hope will give no further trouble.

The results attained have been communicated to the citizens signing the complaint, through Dr. Walter B. Chase, with a request for a report from them to me, in case of further trouble from this source.

I wish to express my thanks to the committee of the Newtown board of health, for their co-operation and determination to do what lies in their power to abate these nuisances.

I shall continue to visit the various establishments in that neighborhood from time to time, and in this way we may be able to keep these odors in subjection.

Very respectfully submitted,
E. H. BARTLEY, M. D.,
Inspector State Board of Health of New York.

FURTHER INSPECTIONS, REPORTS AND RECOMMENDATIONS.

The committee on effluvium nuisances, after examination of the report of Mr. Arthur Hollick, inspector for the State Board of Health, concur in his recommendations. The report carefully sets forth the grievances complained of, and the causes of the offenses. As these causes can be promptly removed it is the duty of the committee to urge and insist that the proprietors, Messrs. J. & C. Moller, at once proceed to change the methods producing the nuisance set forth in the petition placed before them and fully pointed out by Inspector Hollick. These remedies are both simple and inexpensive, and once made and maintained, cannot fail to secure the improvements asked for.

ERASTUS BROOKS, *Chairman.*

STATEN ISLAND, *December* 28, 1885.

STATE BOARD OF HEALTH OF NEW YORK,
NEW BRIGHTON, N. Y., *Sept.* 28, 1885.

HON. ERASTUS BROOKS, *Commissioner N. Y. State Board of Health:*

SIR — The following is a brief report upon Barren Island and the condition of its industries during the past summer:

Inspections were begun on July 1, and were continued twice or three times a week, until September 21.

The agreement made by Mr. E. Frank Coe, to cease mixing fertilizers during the summer, was continued in good faith between the above dates, and I am happy to add that the good example was followed this year by his neighbor, Mr. Steinfels. By reference to my report of October 31, 1884, it will be seen that the establishment of Mr. Steinfels was formerly a source of great annoyance, and the improvement is a gratifying sign of the desire on the part of the manufacturers to do what they can to mitigate the evils incident to their works. Mr. Steinfels has also placed all his stock under cover, which is another decided improvement over the old method of allowing it to remain exposed to the elements.

There has been no change in the fish factories, the work being done in the same manner as before. But very little nuisance is occasioned by them, especially if the weather is hot and dry so that the fish scrap can be quickly cured. Wet weather delays the work and stock is liable to accumulate and become sour. There is yet one establishment that is capable of considerable improvement, namely,

White's. The arrangements for handling the offal as it arrives, and its subsequent treatment, are admirable, but no adequate provision has been made for the storage of the material after treatment. Large heaps of partly liquid and decaying scrap were lying in sheds, and other offal was piled on the open ground outside. Some means should be provided for drying all the scrap before storing, and no offensive matter should be retained for any length of time without proper disinfecting, deodorizing and covering. If this establishment could be improved as much as the others have been I think that we could expect but very little more of Barren Island. The constant supervision has had a very appreciable effect in the mitigation of the nuisance from year to year, and a visitor would hardly recognize the island to-day as the same place of five years ago. The manufacturers are all very anxious to obtain the good-will and opinion of the public, and as a rule will cheerfully act up to any suggestion made.

Mr. Coe commenced mixing on the 22d inst., but White and Steinfels say that they will not begin until the fish season is over — about the last of October.

Respectfully submitted,

ARTHUR HOLLICK,
Inspector.

NEW BRIGHTON, *December* 26, 1885.

HON. ERASTUS BROOKS, *Chairman Committee on Effluvium Nuisances:*

SIR — According to instructions received from you December 22, 1885, I have this day made an inspection of the factories and locality near the head of Newtown creek, to which the annexed report of Dr. Bartley refers.

From my inspections during the summer of 1884, and also from Dr. Bartley's report, I was pretty sure of the source of the greatest nuisance, and to-day's investigation has satisfied me beyond any doubt. The most far-reaching and penetrating odor is from the distillation of bones in the manufacture of bone black. There are three factories engaged in this industry, all of which have been reported upon and described in my previous reports. They are: Preston Fertilizer Company, Blissville; J. & C. Moller & Company, and C. Meyer, Furman's Island. The first mentioned may be considered as of no consequence, for the reason that they distill the bones in iron pots exposed directly to the fire, and nearly all the products of distillation, except at the commencement of the firing, are burnt. Whatever gaseous products escape are conducted into a tall chimney and carried into the higher strata of the atmosphere. Mr. Rowley, the superintendent, informed me to-day that they were considering the advisability of putting in retorts, so that the ammonia could be condensed and saved. I strongly urged him not to do so, as more or less nuisance would be sure to occur.

At the establishment of C. Meyer the bones are distilled in vertical retorts, and the products of distillation, consisting of ammonia and other gases and tar, are condensed and utilized. It is in the manipulation of these by-products that most of the nuisance occurs. Mr. Meyer has invented a method of burning the tar in the fires by means of a steam jet, making a fine spray of the material, which he claims to effect a saving of $1,000 per annum in fuel. And this product was formerly sold at a nominal price to any one who would take it away, or else it was carted out to some vacant land and burned when it could not otherwise be disposed of. The ammoniacal gases are treated with sulphuric acid, in order to form sulphate of ammonia.

The gases remaining after this operation are very pungent and characteristic in odor, and great care should be taken to properly consume them.

Mr. Meyer's former method was to conduct them into the chimney *above* the fire. This merely effected their distribution into the atmosphere from the chimney, and was of but limited value, as the chimney is low. The present method employed is to connect immediately into the fire, thus insuring the combustion of the gas. I understand that this improvement was made upon Dr. Bartley's suggestion, although I was informed about a year ago that it would not do, on account of the danger of a back draught causing an explosion. With proper attention to details, such as caulking all joints in the pipes thoroughly, fitting all covers and connections tightly, working the steam exhausts with care, etc., I am of the opinion that this establishment will be of but little nuisance except to its immediate surroundings. Mr. Meyer has always been ready to act upon any suggestion made to him, especially as he admits that every improvement, designed for the abatement of the nuisance, has paid financially.

The establishment of J. & C. Moller has not been managed with the intelligence that has characterized his neighbors. His method is essentially the same, consisting of distillation in retorts. The entire plant was rebuilt two years ago, but has been more or less a disappointment ever since. The method of using the tar is clumsy, being mixed with fine coal for the fires, or else removed from the premises in the most available way. The ammoniacal gases are treated as formerly described, but the residual gases are not properly consumed, and there is no doubt that most of the nuisance complained of is directly attributable to their escape. The conducting pipe is only made of galvanized iron, which soon corrodes and becomes leaky, requiring to be constantly renewed. It is connected in the back of the boiler fire, where the heat is insufficient to consume the gases. This fire is too great a distance from the ammonia vats to secure proper draught and exhaust. The ammonia vat or "saturator" and the pans are not properly covered. I suggested the following improvements, which Mr. Moller promised to make: First, to dispose of the tar in a manner similar to Mr. Meyer's;

second, to cover the "saturator" and pans with air-tight covers; third, to connect these by means of a cast-iron pipe, securely caulked, with the retort fire, at a point either immediately over the hottest part of the fire or else under the grate bars. These improvements I consider as absolutely requisite in order to effect an abatement of the nuisance.

I have so frequently referred, in my former reports, to the condition of the creek itself, that it seems like mere reiteration to say that the only permanent improvement will be to bulk-head and dredge throughout its entire length, so that there shall be no flats exposed at low tide. It is beyond hope that the water will ever be undefiled while it is bordered by such thickly-settled communities as Brooklyn and Long Island City. If the proposed new sewer for Brooklyn is carried out successfully, however, it will undoubtedly result in a vast improvement to the creek.

Respectfully submitted,

ARTHUR HOLLICK,

Inspector.

LEGAL ASPECT OF THE CASE.

STATE OF NEW YORK:

OFFICE OF THE ATTORNEY-GENERAL,
ALBANY, *December* 14, 1885.

Dr. ALFRED LUDLOW CARROLL, *Secretary State Board of Health:*

DEAR SIR — The communication addressed to you from E. H. Bartley, M. D., inspector, and by you referred to this office, has been duly considered by me.

Dr. Bartley's letter contains statements which are too vague from which to determine definitely that an actual nuisance exists which is detrimental or dangerous to health.

Providing, however, there exists a nuisance which is actually detrimental to public health in the locality designated and of the character specified, which nuisance is maintained by an individual or private corporation, the Board of Health has power to order its abatement in the manner prescribed by chapter 270, Laws 1885.

Very respectfully,

Your obedient servant,

D. O'BRIEN,

Attorney-General.

BROOKLYN, *October* 20, 1885.

Dr. ALFRED L. CARROLL, *Secretary of State Board of Health:*

DEAR SIR — I beg leave to submit the following statements in addition to my former report concerning the nuisances situated along and arising from Newtown creek. In my former report I expressed the hope that certain improvements made at my suggestion by two of the principal offenders would greatly improve, if not entirely

correct, the trouble. These changes consisted in conducting the residual gases from the retorts in which the bones are distilled after removing the tar and ammonia directly into the fire of the furnace and thus consume them. This did greatly improve matters, until one of the firms referred to, Moller & Co., found that this method cooled their fire too much, and made still another change. They took the gases to the furnace under their boilers, and forced them in entirely behind the fire where they are not consumed. Complaints soon began to come in until they are now of frequent occurrence. I have expressed my objections to the firm, and to the mechanic who put in the apparatus. This latter gentleman admits the inefficiency of the method as now arranged. As at present conducted this one factory, if not also Mr. Myer's, is, in my opinion, a *public nuisance* within the meaning of section 385 of the Penal Code of this State. Whether this kind of a business can be conducted in the vicinity of a large city without becoming a nuisance admits of considerable doubt. As the city of Brooklyn extends its residences toward this part of the creek, the time must soon come, if it has not already, when such a stench as now comes from these works cannot be tolerated.

Next in importance to the noisome odors emanating from these bone-burning establishments I would mention the pollution of the waters of the creek itself. Without attempting to mention all the sources of the pollution of this stream, I will mention the two principal ones. These are the sewage of a portion of the city of Brooklyn, and more or less refuse, tar, oil, etc., from the oil refineries along its banks. I have no positive evidence that sludge acid is poured into it, but at low tide a black, tarry, offensive deposit may be seen along its banks which is extremely suggestive of this origin. (See § 390, Penal Code.) The surface of the water is usually seen to be partially covered with a thin film of oil, sufficient to give the odor to the whole stream.

When there is added to this a large stream of city sewage, and more or less refuse from smaller factories, fertilizer works and fat-rendering establishments, the water becomes extremely dirty and offensive. The upper portion of stream flows through a large swamp covering many acres, much of which is under water at high tide, and bare at low tide. It is evident that the great area of sewage-soaked and polluted soil thus exposed to the air must give off a great deal of offensive odor. The air coming from these flats on a foggy or damp night with a gentle breeze is, to many, almost unbearable. Complaints have repeatedly been made that in certain regions not far removed from the creek the paint upon the houses becomes blackened by the same odorous gases. I have confirmed the fact that the houses are blackened by some atmospheric agency. I am of the opinion that a large part of this effect is due to the sulphuretted hydrogen and ammonium sulph-hydrate brought from these swamps and their polluted waters.

Further studies upon this point are in progress. The city of Brook-

lyn is at present constructing a sewer which, I am informed, is intended to carry the sewage of that part of the city in another direction, and thus prevent this very important pollution of the creek.

This improvement is very much needed, and little can be done toward the complete abolition of these odors until it is completed. Besides the causes already mentioned, we may also notice the five or six fat-rendering establishments, the two manufactories of fertilizers, and a glue factory, each of which adds something to the common stench. I have no proof, however, that the odors from these premises reach far enough to constitute a *public nuisance*. I doubt if any thing can be done at present with private corporations for polluting the creek waters, except in the case of the oil refineries, which are bound by a contract, so long as the city of Brooklyn is the chief offender.

As frequent complaints reach me concerning these nuisances, I would respectfully ask for your opinion as to what measures should be taken for their suppression.

Very respectfully,

E. H. BARTLEY, M. D.,

Inspector.

SCHOOL HYGIENE.

LIST OF ILLUSTRATIONS.

REPORT UPON SCHOOL HYGIENE.

By D. F. LINCOLN, M. D.

:. — During the course of the inspections which were made under ection of the State Board of Health in 1881, the writer of these ad opportunity to observe the actual condition of the school build- many widely distant places in the State of New York. The present s based chiefly upon these observations.

irst edition dealt chiefly with questions relating to the construction ol buildings, as ventilation, heating, lighting and desks. The pres- tion is essentially the same in these points, but has in addition emarks and illustrations upon drainage, and a plan or two which rve as models for building school-houses, or may at least offer sug- s and aids to those intending to build.

des these points something is also said in regard to the prevention agious diseases, and to the general question of the effect of school d work upon health.

writer's thanks are due to those teachers and guardians of schools ave sympathized with his work, and to whom he has tried to make ractical use.

INTRODUCTORY.

uman being, considered by itself, is a unit, and has value as such. mbination with others, it forms a part of a compound unit, a larger , different from any of the individuals composing it, and endowed pecial productive or destructive powers. But every thing has its and the gain is associated with a loss. The man who forms part of sociation gives up some of his own individual rights. Tied to a ne, he becomes a part of it. Does the child lose any thing by being orated in the system of common schools? Doubtless he does.

hild who enters a public school is conscious of a change in his sur- ings of which he cannot give an account, but which constitutes for new world. He has ceased to be an individual, and has become a nal part of a machine. He has been well understood by persons ave watched him from his birth, and who are deeply interested in rson. He is now transferred to the care of strangers, who meet im only five hours in the day, and whose interest in him is re- d by the fact that he forms but a fraction — say from one and one- to two and one-half per cent — of the total group of children that

is intrusted to the care of a teacher. He is held by the teacher a few months, and then passed on to another, again as a fraction, not as an integer.* Does he not lose much, as well as gain something, in this system?

As regards his health, he loses that defense which the sympathy of the community always extends to an individual who is suffering conspicuously. Taken generally, all children in school are suffering some discomfort. Average the discomfort among ten thousand, and it may not be very great for each one. But a class of fifty children is not made up of fifty *averages*. Let us imagine such a class, containing among its members representatives of the common affections of school life, such affections and complaints as the writer of these lines has frequently had to encounter among the children in public schools. Individual number one has a ravenous appetite, sleeps soundly, works little, plays much. Number two is a little pale, eats less in term-time but recovers his appetite each vacation. Number three is detained at home occasionally for headaches, caused by poisonous carbonic oxide and carbonic acid gas, from the stove, or by the foul air of the crowd. Number four mutters arithmetic in his sleep, especially just before the annual examinations for promotion. Number five occasionally sits in a draught of cold air, and catches cold; while his next companion has a tendency to catarrh of the ear, and is gradually becoming deaf under the discipline of a school which confines him to one spot. Number nine is a child whose parents are near-sighted; he sits in a corner of a dark room, where light is insufficient for writing in the winter season; he is allowed to sit in an attitude that brings his eyes within three inches of the book, and he is placed in a desk which is so high and ill-adapted as to prevent him from holding the object at a proper distance. He is complained of as dull, listless, inattentive to what is written on the board, when in reality he is shut in upon himself by the fact of near-sightedness, which condition is aggravated every day by the way his education is carried on. Number twenty has just recovered from the measles, or perhaps we should rather say, is convalescing — for she is a little pale and weak, her eyes are not strong, and her eager nervousness hints at the reason for her premature return to study; she wants to be present at an examination, on which her "promotion" will depend.

Numbers thirty and forty-one wear glasses; one pair has been placed on the child's eyes by the most accomplished medical skill, for the relief of far-sight; the other has been picked up from a tramping pedler.

Now the classes are ordered to write. They begin in good form; but in three minutes' time their heads are bent within an average distance of three inches from the copy-books; and a distorted position of the body is inevitably produced by the faulty shape of the desks. These scholars, the teacher says, write about twenty minutes a day, and that cannot be long enough to inflict any permanent injury. But in another room they are adopting the "Quincy method," and the scholars write a good deal

* It would be very unjust to many faithful teachers to present this as the universal fact. There are many exceptions, local and personal; but the general tendency remains as stated.

in the upper classes they write long translations and composi- opy out lectures.

'r room may be seen a class of boys and girls of about fifteen They pass in file, and there is opportunity for seeing that not of the girls has an erect figure; many stoop painfully, and y whom the eye reaches, four or five appear to be deformed curvature of the spine. Here is a tall young woman who sits with the upper part of her body across the desk in an attitude She is an overworked person, and the school is not wholly r that. But the school may be responsible for the ill-shape of f her chair, which gives her no real support in sitting, and r to lean forward instead to relieve a pain in her back.

s as these will constantly meet the eye of one who visits our hools and studies the health of their inmates. And is there rence from such facts? Are they not of that class which ty and a responsibility? Human life is the best of human ; and the best part of life is the hope that we are leaving hose who will be more able and worthy to enjoy it than we These successors of ours are the children. Can any thing ore closely than the thought that there is a group of influences, d wide-spread, which are constantly acting to lessen the worth ing life?

VENTILATION AND HEATING.

uch?" and "How?" are the two great questions in ventila-

on implies getting bad air out, and good air in. The amount arged from the lungs is small. If we could catch it at once pass out of doors, very little ventilation would be needed. nd that the breath mingles rapidly with the air in the room; y thing to do is to change the air of the entire room frequently. should be so rapid, that a person coming from the fresh air otice closeness, or a close smell. In order to produce this house permanently dwelt in, sixty cubic feet of fresh air should per minute, for each occupant. In a house occupied for short en aired out by sweeping draughts, like a school-house, half is desirable — that is, thirty cubic feet per minute, or half a ond.*

easuring 32 feet long, 25 feet wide, and 12½ feet high, con- cubic feet of air, which allows 200 cubic feet per scholar to a scholars. If one person is supposed to require 30 feet of fresh

of fresh air required is the amount which is needed in order to dilute the impure air ndard of relative purity. All good air contains a small proportion (4-10000) of car when human breath is added, the amount is increased. It is found from experience ncrease brings the total amount to beyond 6-10000, the air begins to smell close. A erefore, add two parts of carbonic acid to 10,000 of air before it becomes objection- ould breathe out two feet of the poisonous gas in an hour he would affect 10,000 ts extent; but as the real amount expired in an hour is about one-third of two feet, ders unfit for use one-third of 10,000 feet, or (more exactly) 3.500 cubic feet of fresh

air per minute, then each one's allowance will last a little less than seven (7) minutes. Hence, the requirement is that in such a room the air should be changed by the ventilators at least eight (8) times an hour! And not only this, but there must be a large supplementary change of air by means of opened windows, from time to time.

This requirement will seem startling to those who hear it made for the first time, but it is the acknowledged standard of science at the present day. We should not depend, in this matter, upon statements made by even good authorities, a few years ago; the standard of purity as set by Parkes and De Chamont is the one to follow. There are very few buildings in which it has been attained; but every step taken, ever increasing the purity of the air of a school-room, is followed by a gain in health and comfort, and no one should feel discouraged from attempting improvement, even upon a small scale.

If we wish to ascertain by calculation how much the ventilating arrangements of a given room are actually supplying, we may limit the question at first to the point, how much air is *drawn out* or makes exit in each minute or second of time; since, for each cubic foot of air taken out, another foot must come in. It will be right to ask afterward whence the new supply comes, and what its degree of purity is. But in our climate rooms cannot be ventilated without flues; and if the flues are acting well all the air that leaves the room will leave through them. If the flues are weak and insufficient, it will be hard to make an estimate of the amount of ventilation, but it will usually be small.

CONSTRUCTION OF FLUES.

Few people are aware how small a quantity of air is actually drawn out of apartments by ordinary flues for ventilation. By "ordinary" I mean the old-fashioned sort, of the size of one or two bricks, 4x8 inches or something about that, with a close grating called a register to obstruct the current at the bottom, a sharp angle at the foot, the inside roughened by protruding mortar and with only an accidental opportunity of getting warmed by contact with a smoke-stack. You stand in front of it with a light pocket handkerchief; the cloth is gently drawn toward the opening; it deviates a couple of inches; you say "it draws," and are satisfied. "The thing is working." Probably, in such a case, the rate at which the current moves is something like a foot per second. The flue is drawing out a quarter or a half of a cubic foot of air per second — enough, perhaps, for *one person's* requirements. A large school-room may often be seen provided with half a dozen or more of just such ventilating flues which are considered to be "the correct thing," and are pointed out to the visitor as the evidence of good ventilation in the house. Evidently the question of "How much?" is of leading importance in some other matters than those of finance and trade.

It is strongly to be recommended that school authorities should take steps for ascertaining the real working capacity of the flues in the school-houses, for the degree of deficiency can never be known in any other

anemometer will give a pretty faithful statement of the cur-
lly passing the flues. Analysis for carbonic acid in the air of
will give an excellent test. Nor ought we to pass without
ie useful but too often uneducated sense of smell; it furnishes
make the foundation of all our mathematical calculations, and
a faithful guide for a short time.

ating flue must draw, or it is worthless. This quality, which
ole merit, is dependent on several points.

uld be as straight as possible from beginning to end. Curves
are very great obstructions.

uld not, as a rule, be horizontal, or descending in any part.
special exceptions to be noted hereafter.

uld be continuous from the beginning to where it discharges
rs. A flue that ends in an attic has less carrying force than
oes up through the roof. The air comes up with a rush, and
d in the air of the attic; the rush, the momentum, which it
it is lost in the space. True, the air will get out by a ventil-
ridge-pole, if there is one, but the conditions for successful
re best attained by a continuous column. A tight box lined
ay properly be used to collect the flues and discharge their col-
tents by an opening, as in Fig. 1.

uld be smooth internally. A tin pipe is as good as any, and
vantage of not parting with heat so quickly as dark or slightly
metals will. If a brick flue is used it should be larger than
ions named above, and should be plastered smooth inside. The
ces in walls should not be relied on to do the work of flues.
is very small, and the friction against the bricks or lathing is

uld be so protected as to lose no heat. A tin flue passing
cold entry should be boxed with wood. It should not have a
distance to traverse in the open air, if of metal. There is,
certain advantage in compelling tubes to converge inside of
s in Fig. 1, instead of passing up straight through the roof, as

uld be so protected that the rain will not beat in or the wind
. Certain caps will accomplish this object satisfactorily.

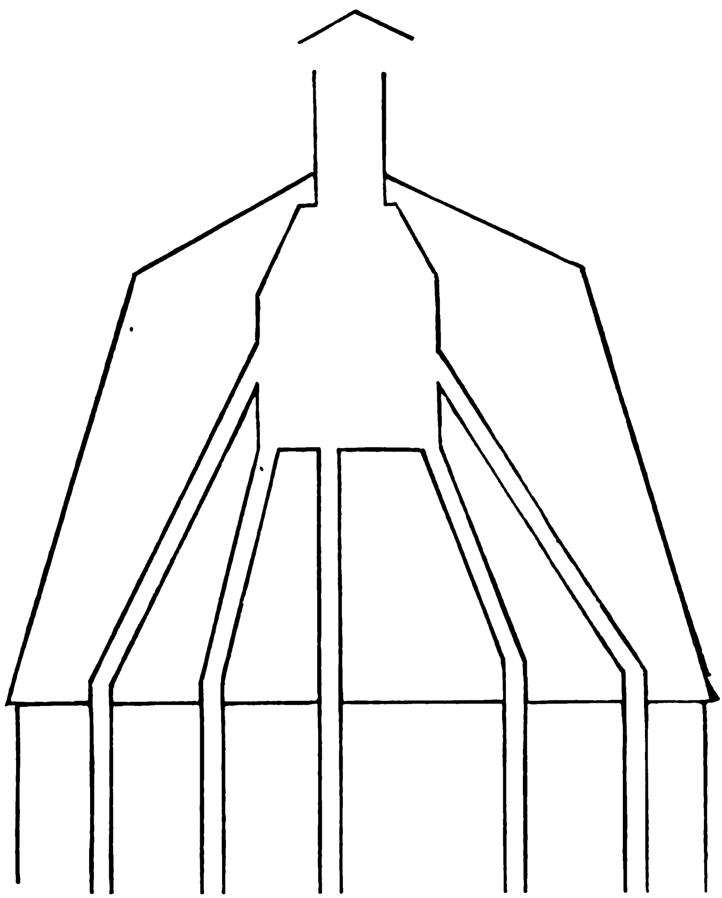


FIG. 1.

There are other caps which increase the upward draught when t wind is blowing upon them, but their action is uncertain, and they n sometimes check the upward current instead of assisting it. The out should not be a narrow one, barely equalling the capacity of the fl and compelling the current to twist and turn in making its exit.

It will be useless to rely upon the "extractive power" which so ventilator caps are said to possess. This power, if it exists, is larg dependent on the force of the wind, and must therefore be reduced nothing at times.

7. The flue must be devoted to the uses of a single room. If it ope to rooms on successive stories it often serves as a passage from one sto to the next above, especially when the flue is not warmed. The heat flue, on the other hand, when drawing from different stories at once, h a much less powerful action upon the upper story.

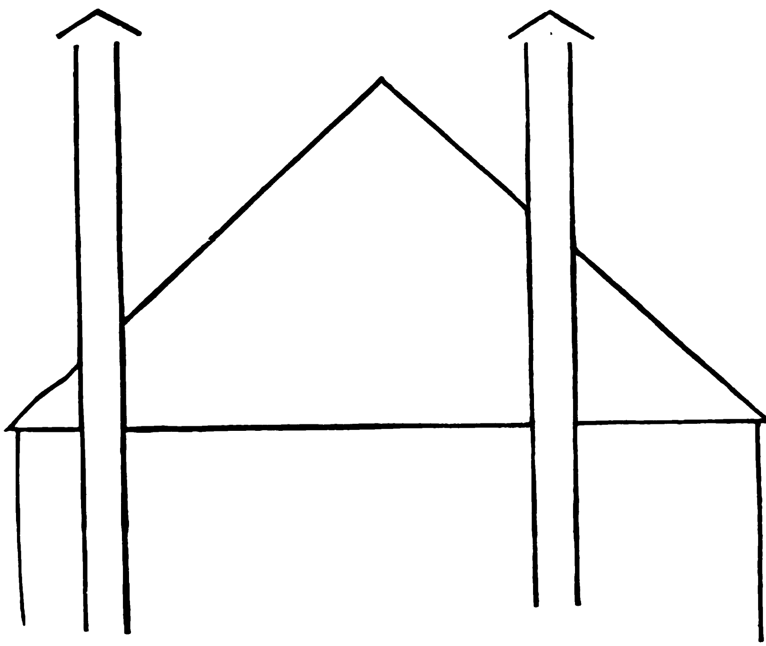


FIG 2

8. The flue should be warm; at least it must be as warm or warmer than the outer air, or else the current will be inverted.

Flues ought not to be placed in *outer* walls. Much heat is lost and the opportunity for heating by contact with the chimney is sometimes omitted. An air-space is sometimes employed as a defense. When, for instance, a triangular brick flue is placed in the corner of a room (which is a good arrangement for saving space), the wall should be double on the outside.

WARMING OF FLUES.

The subject of applying warmth to flues is a somewhat extensive one, but a few methods ought to be mentioned.

(*a*) A brick triple-shaft with the central flue devoted to the smoke from the furnace and the two side-flues for ventilators.

(*b*) A brick-flue heated by the metal smoke-flue from stove or furnace (twelve-inch cast iron pipe).

(*c*) Flues of any kind containing steam pipes or coils, specially intended for heating the flues. This is a comparatively expensive plan, both in first cost and in running. The steam thus used costs extra; whereas in plans *a*, *b*, and *f*, the heat employed is that which would otherwise be wasted.

(*d*) Steam-coils placed in the chest at ridge-pole (fig. 1). This is not an economical plan to apply heat; it affects only the upper few feet of the column of air. Still, it may be advisable in some cases.

(*e*) Gas-jets burning behind a pane of glass, which is let into a tin pipe. This is efficient, yet inexpensive in construction. The efficiency is increased by Gouge's methods.

(*f*) In a variety of ways the stove or stove pipe can be made useful to expel air from the room. The following paragraphs describe a few such plans:

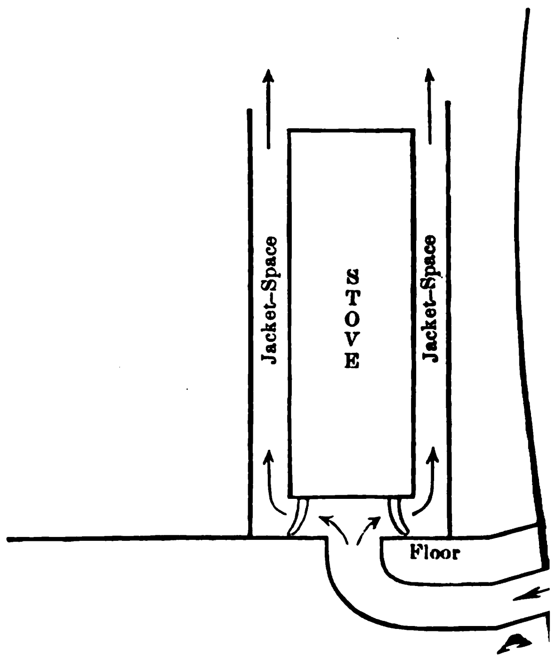


FIG. 3.

STOVE VENTILATION.

The "jacket" or metal screen for a stove, can seldom be dispen with in a school-room. Its first use is to protect from excessive heat, it may also be used as an aid to ventilation. Fig. 3 shows how this is do A metal cylinder, considerably wider than the stove, is placed around latter, and its edge is fastened to the floor. A good sized pipe is th carried through the floor, under the stove, and led through the house-w at A. Guard the inlet with a screen of wire at A, and a considera supply of pure warmed air is drawn into the room. This is one of t cheapest and best devices for warming and ventilating. Some prefer extend the jacket around only a part of the stove and leave the door u covered; or the jacket may stop at the bottom of the stove and be ma fast to the latter at that point. The arrangement is similar in effect to "portable furnace," such as is usually placed in a cellar or a baseme hall.

In *figure* 4 a stove is represented standing close to an open windo The movable semi-cylinder of metal, commonly used for a screen, ha been so placed as to enclose the stove on all sides except that towar the windows. Cold air may then be freely admitted; it is quickly warme by contact with the stove and is thrown upward with the general current

Figure 5 shows air brought in so as to be warmed by contact with

stove pipe. The inlet flue is enlarged and runs up with the stove pipe, like a jacket, for some distance.

Figure 6 shows how a stove pipe may assist in removing injurious air. The diagram represents a two-story house with a chimney which comes down to only a very short distance from the roof. The opening into the chimney for the stove pipe is enlarged so as to receive a much larger pipe, which encircles the stove pipe like a jacket. This jacket may stop short at A, or may be carried through the floor to B in the first story. It will secure a draught from either story as may be arranged. The idea of this and the preceding figure is borrowed from an article in the report of the Michigan Board of Health for 1879.

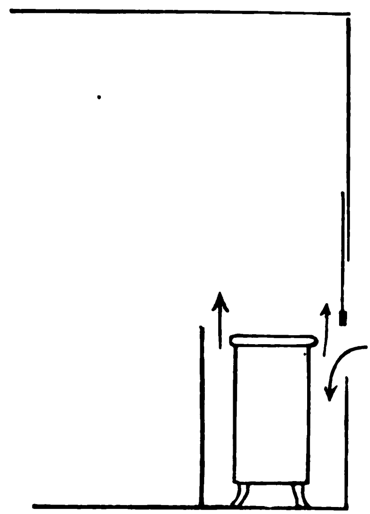


FIG. 4.

A chimney into which a smoke-flue discharges may be opened at any point *below*, and not too near, the point where the smoke enters. Many rooms, for instance, have chimneys which reach to the floor, while the stove pipe enters near the ceiling; such chimneys ought to lend their powers to the task of ventilating the room by an opening near the floor. The latter ought to be closed when the fire is making.

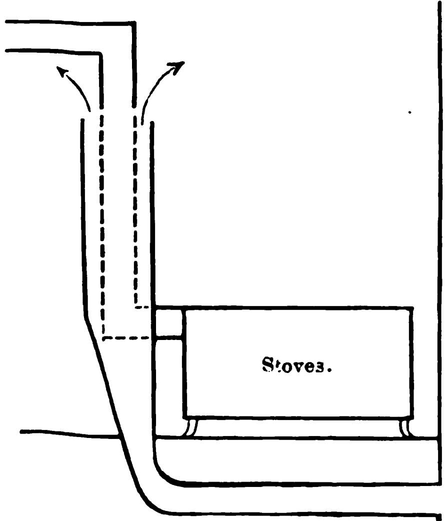


FIG. 5.

The term "aspiration" is applied to the suctional force of heated flues. In large buildings a single shaft is often planned so as to do the whole work; in this case, the room-flues sometimes run in the floors directly to the shaft, while in other buildings all the flues are made to descend to the base of the shaft before entering it. A discussion of this matter on a large scale is beyond the purpose of this paper. Where the number of rooms is great and the exposure to the weather is different in different parts of the building, unequal action is likely to occur.

If the shaft or flue opens into the upper part of a school-room, the air drawn out is several degrees hotter than if it opens near the floor. The draught is therefore more powerful. Still, it is best to draw the air from a point near the floor, the effect of which is to stimulate the circulation of the warm air of the room in a downward direction, thus equalizing the temperature and increasing the value of the heat given out by the stove. No draught will usually be felt from it by a person sitting at the distance of four or five feet. We need not be influenced by any theoretical considerations as to the level where carbonic acid is most abundant — there is no great and constant difference between different levels; but we shall not fail to find sources of impurity of air more frequent at or near the floor than higher up. If gas is burning, the case is different.

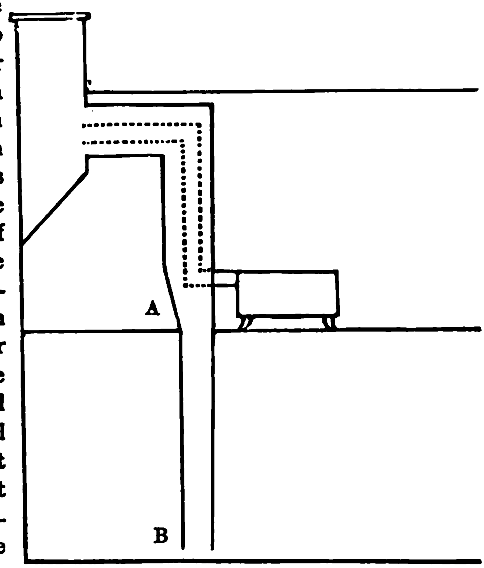


FIG. 6.

As regards a heating apparatus, furnaces in cellars are most manageable when standing directly under the rooms they are to heat, or at the windward corner of the house; in other cases they sometimes play strange tricks, refusing to yield warm air, or drawing it out from the room. A steam apparatus has this advantage, that the heat can be placed just where it is needed. Whenever a supply is wanted in a room, a tin pipe (wood should be avoided as unsafe), can be led down from that point to the cellar, and a steam coil put there, encased in a wooden box lined with tin to save heat, which has a value for stormy weather; but in no case should air be taken from cellars for school consumption — certainly not while the school is in session.

SOURCES OF FRESH AIR.

There is much carelessness about the source of air which is drawn into furnaces for heating, and sent up into rooms. The ground may, it is true, be a pure and inoffensive bit of turf, but that is an unusual condition in a city school yard. Bad air, malarial air, is known to settle upon the ground in many cases. The ground-level is less reached by the renovating breezes than higher levels. Sundry unpleasant surroundings of school-houses are at the ground-level. As a rule, openings for drawing the outer air into the heaters had better be at points above the children's heads, and covered with wire netting.

Something more should be said of the cellar. It cannot be too often repeated, that the purity of cellar air lies at the foundation of the purity of house air. The danger of severe and sudden illness lurks in cellars, as often as in sewers. The common practice in regard to cellars is to bury the drain under its floor — to place water-closets in its darkest corners — to store combustible rubbish in wooden bins (I have seen great heaps of paper scraps) — to pile away old rotten boards and clothes — to hang children's outer garments in it — in short, there are few uses of a menial sort to which it is not put. The cellar is often without a proper floor, often is very dark and close for want of windows, often is darkened by placing the heater-boxes in front of windows.

To these sources of pollution (for darkness is one source) add the fact that in cold weather a powerful outside pressure exists, forcing air into the cellar, and thence into upper parts of the house. It is too much to expect that an average cellar will be so pure, so free from all these objectionable things, that air may safely be taken up from it by furnaces for the consumption of the house.

Let the floor be concreted or asphalted so as to be air and water-tight. Put no drain underneath, unless in trench with a wooden or stone cover. Put *one* large trap outside of the walls for each sewer, ventilate it by an opening just inside the trap, run the soil-pipe up full sized several feet above the roof, and protect it from rain; ventilate the trap under each washstand. Have no water-closets in the cellar; or if they be thought necessary, isolate them in separate chambers of masonry with abundance of light, accessible to the children from the outside only of the house. Give a plenty of windows and good height, and keep the walls whitewashed.

Indirect Radiation.

Heating "by direct radiation" means the use of steam coils placed *in the rooms* to be warmed; it economizes heat but does not assist ventilation. There are some devices for introducing fresh air so that it shall pass over such coils; holes in the wall of the room with valves, etc., but they are ineffective for the most part. The coils should be *in the basement* enclosed in separate boxes, and with separate, abundant air supplies. Such boxes may be made of wood lined with tin, to save waste of heat. They will naturally have a door in the side for inspection of the interior, but that door ought to be kept closed and locked; no *cellar air* should be allowed to enter the receptacle of pure, warmed air for the supply of a school-room.

If a coil were substituted for the stove in figure 3 it would make a good apparatus.

The objection to "direct" heating is the deficiency in the supply of fresh air. The same objection holds good in the case of "hot-air furnaces," if they are driven excessively and deliver a small quantity of overheated air. The latter condition should be rectified by making the furnace and its channels of inlet and delivery *large enough* to give an abundant supply of *warm*, not *hot*, air.

It must be constantly borne in mind, that the scholars are not to be exposed to draughts of cold air when it is possible to avoid them. In every way, we should try to warm the air, even a little, before it enters. The methods shown in figures 3 and 4 illustrate this, but are not in themselves adequate to give a *full* supply of air.

If a room has a strong exit-draught, it is evident that much air must also enter it. It is possible that a school-house may be so built that the former point is attended to, and the latter neglected; there is a good ventilator, but no supply of fresh warmed air. In such a case, it may happen that the school-room will suck in its supply from the adjoining cloak-rooms, halls, passages, water-closets, and even the cellars, with unpleasant results. It is not proper to seek to supply the defect by keeping windows constantly open—or by open transom-sashes; windows cause draughts, and ought not to form an element in our calculation, if we are planning a system of circulation of fresh air. Fresh *warmed* air is wanted.

A point against the direct method of radiation is the difficulty of governing the amount of heat in mild weather. This should be considered, however, as a defect of arrangement. Coils should be in duplex or triplex systems, and it should be easy to shut off steam from one half or two-thirds of the pipes.

AUXILIARY MEANS FOR VENTILATION.

No system of flues, however skillfully and liberally planned, is likely to take the place of windows altogether. This paper has already made the assumption that school-houses require but half the amount of fresh air which is required for permanently occupied houses. What justifies the assumption? and what conditions must be looked to in order to supplement the assumed deficiency? "Thirty cubic feet of fresh air per minute and head" will not keep a closed room fresh for two or three hours of uninterrupted school-work.

There are certain auxiliaries to ventilation that are in the power of the teacher; and there is also something in the original plan of the building which contributes to a free movement of air, or impedes it. We will, therefore, speak of. 1. Airing-out; 2. cleanliness; and 3. floor-plans.

1. Troops on the march are accustomed to halt ten minutes at the end of each hour. A school should also have its halting times (and once in an hour is not too often), when the air may be renewed by a quick and brief opening of the windows, while the pupils go through some light gymnastics. A principal use of the fifteen minutes' recess is to effect this more thoroughly. A complete renewal should be accomplished after each session, and no room allowed to be closed after sweeping until the dust has wholly subsided as far as the sense of smell can judge.

It is no wonder that teachers are glad to get rid of the old-fashioned school recess. Houses are now placed in the midst of thickly-settled towns, where the children, if they are allowed to run in the streets, are in personal danger, and if kept in the yards have hardly elbow-room.

Their shouts annoy the neighbors — though shouting is really one of the best parts of their play. Some teacher has to watch them while in the yard; and this must be, especially for ladies, one of the most difficult and distasteful parts of the teacher's duty. If the rooms are aired out at recess, some of the delicate or lazy, or over-studious, will object to the draught. I know a school where there is but one yard for boys and girls; they have, therefore, a recess at different times for the two sexes, and one-half of the scholars are always left in the rooms, so that no airing out is possible. Still, the uses of recess remain. To provide for the delicate children, or for the case of bad weather, a play-room, warm, airy and light, ought to be provided.

No apparatus that can be named will do so much good at a very small cost as the window-board. By that term I mean a plain piece of board, as long as the window is wide, and from four to eight inches wide. The lower sash is raised, the wood is inserted, and the sash is shut down upon it. The air enters in a thin stratum passing upward between the upper and the lower sash, in a nearly perpendicular direction, without causing perceptible draught.

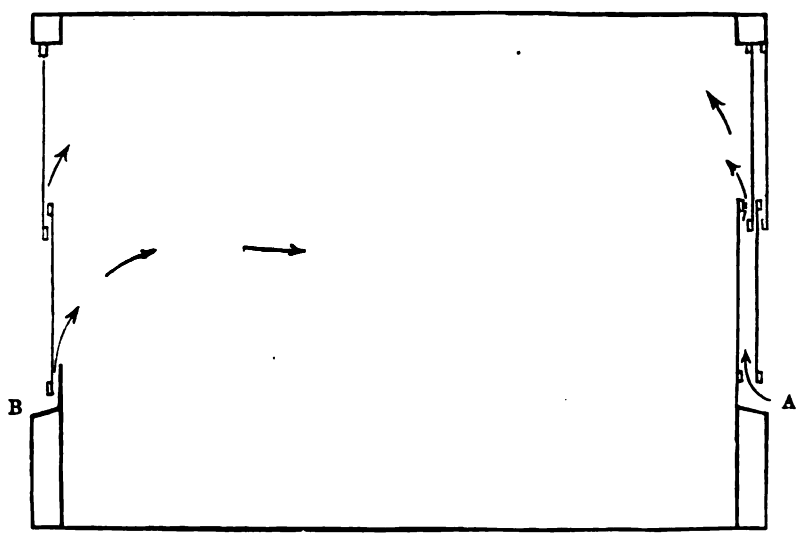


FIG. 7.

The diagram (fig, 7) represents a window provided with the board, and air entering at A. The window is, however, represented as double; this gives great protection from the cold, and also enables the air to enter the room slightly warmed by contact with the lower pane. All four sashes of double windows should be movable.

In many places, teachers have told me that they have found these simple methods of much service. But it must be borne in mind that they may give rise to draughts, which are unpleasant or even injurious to certain scholars. Some are more sensitive than others, and some are subject

to chronic catarrhs of the throat or ear-passages, which are very easily aggravated by draughts.

The window-board is sometimes pierced with holes for tin pipes, which are bent upward at right angles. This effects the above-named results at a greater cost.

A kind of mosquito-bar, covered with thin flannel, may be used to sift dust from the air. But dust-sifters are air-stoppers. Such apparatus is not adapted to the case of rooms with many occupants.

CLEANLINESS.

2. There is an invisible something which clings to the substance of wood and plaster, and continues to give out a smell after the air has been renewed. This sort of emanation cannot be conducive to health. It brings startling suggestions of "hospitalism," or hospital smells and infections. Whoever will aid in banishing this smell from schools is a benefactor. Strict cleanliness is the remedy, associated with good ventilation.

It is not superfluous to say that once or twice a year is not often enough to wash the school-room floors! Schools do exist in which the washing is done weekly on Saturday morning, the sweeping daily after sessions, and dusting daily in the morning, everything being finished half an hour before school opens.

A floor might be non-absorbent. Seasoned yellow pine and maple are both good materials; they can (especially maple) be so prepared by oiling as not to need washing, but only the use of a damp cloth.

Dust comes from the mud brought in upon the children's shoes. There ought to be no muddy school yards. The use of mats and scrapers must be provided for and enforced.

Children of the poorer classes come to school with their clothes smelling of the day's cooking, and much else. Teachers and charitable visitors can do much to encourage or compel children to come with clean and decent garments, and clean face, hands and hair.

CLOSETS FOR CLOTHES.

It is not proper to hang overclothes in the rooms where scholars sit. A closed wardrobe or closet in the school-room condenses the effluvia, and concentrates the effect of packing a quantity of moist, reeking rags. The chance of diffusing infection is increased by such contact. A closet should be large enough for each child's clothes to hang without overlapping another's. It should have good light, and free circulation of air, and be well warmed. If the corridors are wide, warmed, airy and light, a portion may be set off by a board partition for the use of each class, the boards to reach six feet in height, and to come within six inches of the floor. If clothes are hung in the basement, care should be taken that the furnace does not send the air of the clothes-room up-stairs.

Walls that can be washed are a desideratum; paint answers the purpose well. Wall paper is so pretty that it is a pity to condemn it; but it is very absorbent, and not allowable under strict sanitary rules where large numbers are congregated.

PLANS OF BUILDING IN REFERENCE TO VENTILATION.

3. In planning a house, it is well to place the windows and doors so that those slight currents which enter by cracks or by partial openings may traverse all parts of the room. We thus call to our aid a correct principle of "natural" ventilation which should not be lost from sight even when we think our artificial methods are perfect. Let each room be adapted to the rapid renewal of its air by swift currents which reach every corner as soon as windows and doors are flung open; and let this kind of airing occur more than once in each day's work, and once after each day. Such a room is seen in Fig. 9. A room planned as in Fig. 10 will be likely to have less perfect ventilation. And fig. 11 shows a still more decided error. (Compare rooms E and F in Fig. 13, which are well ventilated.)

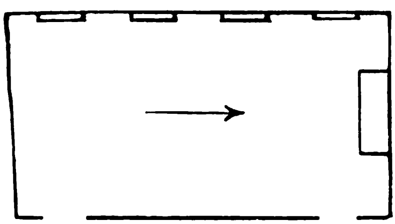


FIG. 8. A room well-shaped for imperceptible ventilation, or for quick change of air when desired. Two doors, four windows. Pupils face in the direction of the arrow.

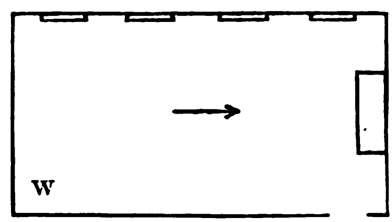


FIG. 9. Ventilation more liable to be imperfect. One stagnant corner at W.

A corridor or hall may be regarded as a supplementary aid to ventilation. It ought to have sufficient means of heating, and here, if anywhere, is the place where direct radiation is suitable. It should run straight through the house and have practicable windows at both ends which should be open except in the severest weather. Not being occupied by scholars the air will be easily kept pure under these circumstances. The use of transoms over doors is to draw upon this supply of pure air.

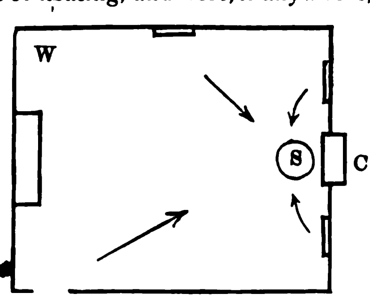


FIG. 10. The chimney, C, draws air from the room by two ventilating holes. The stove acts in like manner. Air entering by small cracks at a door and three windows, taking the direction shown by arrows, leaves the corner W. unventilated. Taken from a school in Rochester.

The school-house should be so cut up by corridors that every room should have a corridor running along at least one side. A house thus cut up is analogous to a city with broad streets; the air circulates more quickly and in larger masses.

The heaping or packing together of rooms is a distinct impediment to ventilation. The air which passes into a room through unperceived channels may be estimated as sufficient to change the contents of the

room once in an hour. Now, every room has four sides, a top and a bottom. Examine the condition of a room thus packed — say one of the middle rooms in Fig. 12. It has a cellar below, rooms on three sides and above; hence its unperceived renovation of air must come very largely from impure sources. Wind blowing from A will force air into B; wind blowing from C will force the air of the front room through the middle and rear rooms. The very multiplication of partitions, however, is itself check to currents of air.

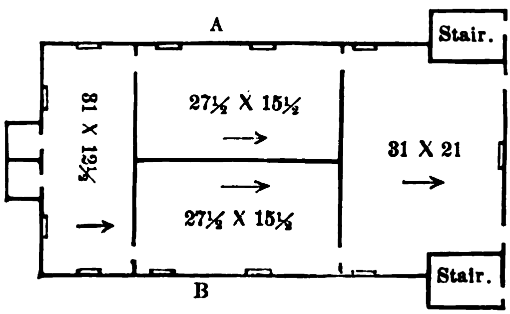


FIG. 11. Seventh Ward School, Troy. Unsurpassed for compactness; glass partitions; pupils face the light.

Figure 12 shows a good use of corridors. Better still, if rooms A, C, D, had been placed lengthwise along the corridor, instead of endwise

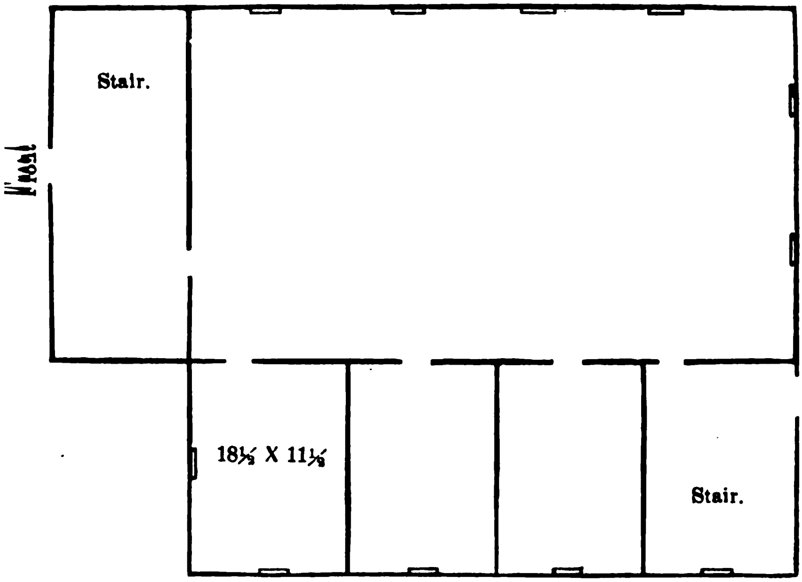


FIG. 15. Court Street School, Utica. Compact arrangement, four rooms contiguous. uld easily be enlarged so as to give four rooms, forty scholars to each room, with cor- or in middle. Arrangement bad for airing small rooms.

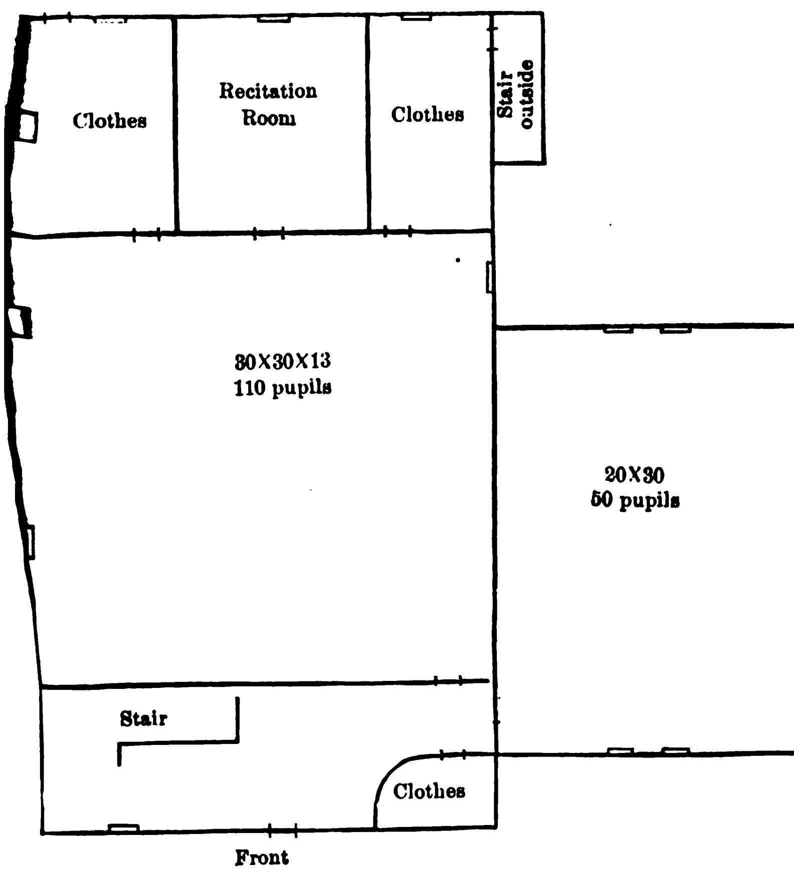


FIG. 16. Francis Street School, [illegible] Light insufficient in large room. rangement interfering with light [illegible]. Very badly planned for [illegible] tion.

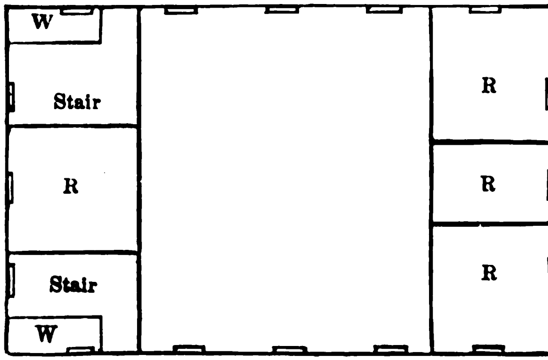


FIG. 13. Thirteenth Ward School, Troy, old pattern; recitation room system.

The analysis of plans of school-houses leads us to form a distinct class or group of those which have recitation rooms as an adjunct to one large common study room. This, the recitation room plan, as it may be called, is exemplified in Fig. 13. It has the faults of the compact plan, with very little modification. In a house of this sort one looks into the small rooms at once for instances of bad air and crowding. It is not sufficiently remembered by school builders that the class requires pure air when reciting as well as at other times. One-half of the scholars are sent into the small rooms, which in aggregate space may equal one-third of the room they leave. Those left behind enjoy tolerable air; while commonly those reciting are intolerably confined and cooped up, without a chance for relief (for draughts at close quarters are dangerous) until the hour is over. The example following (Fig. 14) shows an improvement in two respects, as indicated in the note to the cut; it is evidently based on the previous model, while the two following show a like affinity for each other (Figs. 15, 16). The objections on the ground of light will be named on a later page.

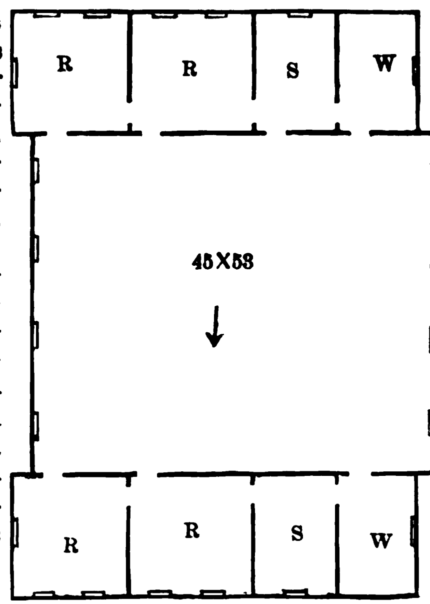


FIG. 14. Sixth Ward School, Troy, built four years ago. (R, recitation rooms, about 16 feet square; S, stairs; W, wardrobes.) This figure shows the recitation room system; size of R still too small for the number that occupy them; breadth of large room between windows more than is desirable. The improvement, as compared with Fig. 14, consists in the placing of stairs at both ends.

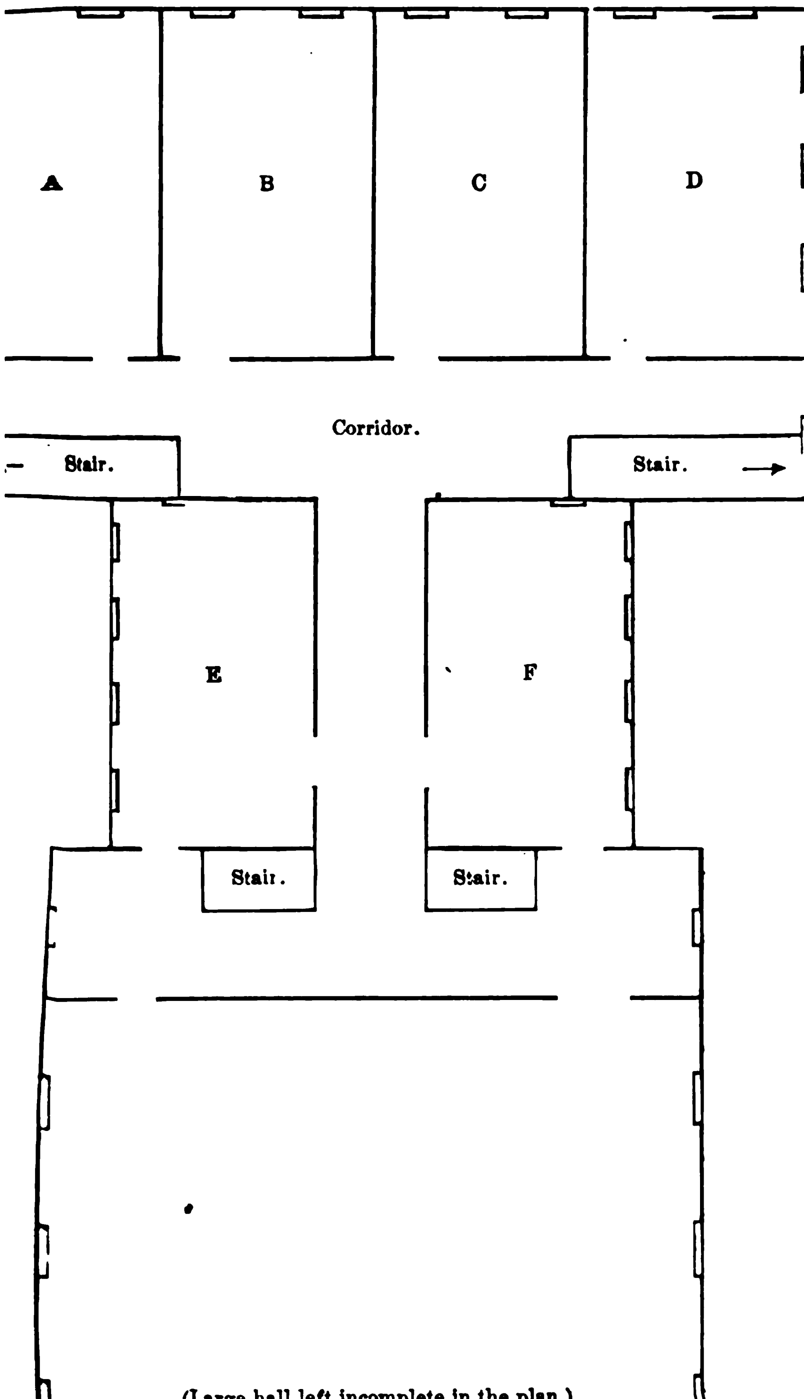


FIG. 12. School No. 2, Yonkers.

TEMPERATURE.

Poor ventilation is so often connected with overheating that the latter must be ranked with it as a cause of ill health. Hot rooms are a common cause of "taking cold." They give a headache to some. They sometimes aid in keeping up a forced activity of the circulation of the brain and nervous centers, causing nervous irritability and sleeplessness. Weak sight, especially near-sight, is greatly aided in its development by hot rooms and bad air. The heat acts at once in flushing the face and producing congestion of the eyes. It acts indirectly and chronically by producing a slow debilitation of the system and impoverishment of the blood. Such a condition is most favorable to the production of weak or short-sight. Bad air, poor food, late hours, overwork, dissipation, anxiety, are causes which work toward the same result.

What is "overheating?" It is a little difficult to reply. However, it is certain that there are teachers who succeed in keeping themselves and their classes comfortable and cheerful at temperatures ranging from 60° to 65° Fahr. I have seen a boy of ten years sitting in shirt sleeves, having taken his jacket off because he was too warm; the thermometer stood at 62° on the desk beside him, and the other pupils were comfortable also. It is clear to me that the range from "68° to 74°" is decidedly too high for a standard. Some teachers may require this degree of warmth, especially if suffering from colds; but a lower range, even one which has 68° or 70° for its highest point, seems desirable for schools. It is, moreover, a fact that we are comfortable at a lower temperature in pure air than in impure.

LIGHTING AND EYE-SIGHT.

The influence of school life in promoting the increase of near-sight is by this time one of those commonplaces of which the reader cannot be supposed to be ignorant. Germany, Russia, Switzerland and France have all contributed statistics, showing that the affection is a universal epidemic, localized wherever severe duty is pursued, attacking all grades except the very youngest, and increasing in regular progression from the commencement to the end of study. At the moment of writing, a paragraph is going the rounds of the newspapers, giving the statistics of the six hundred pupils in the High School of Chemnitz, Saxony, in which in eight classes, beginning with the lowest, the proportion of near-sighted is respectively 10, 17, 20, 25, 35, 44, 44, 64 in 100. This one series is a fair representative of a score all made with great care and exhibiting the same result.

The case is different in America, but only in degree. Children study a good deal less, their school accommodations (in cities at least) are better, and their mode of life in some respects is better, than in Germany. But there is a considerable amount of near-sight in this country. Three hundred and twenty-one students were examined by Dr. Derby on entering Amherst College, and 35.9 per cent were found short-sighted. One class entered with 44 per cent and graduated with 50 per cent. In brief, although

we have less absolute near-sight, still that which we have is of the same nature and tendency; it is engendered by study, and is increased by continued study as rapidly as in Germany.

The percentages of near-sight in 2,500 public school children, examined by Drs. E. C. Loring and R. H. Derby, in New York city, were 3.5 for the youngest classes and 26.78 for the oldest. The poverty of blood and weakness of fibre which are produced by bad ventilation and over-heating contribute to the causes of near-sight in no inconsiderable degree. The point of most immediate interest, however, is the amount and distribution of light in school-rooms.

Certain fashions in architecture interfere with the requirements of airing and lighting. Pointed windows, heavy mullions, buttresses and cornices, may do so. In all styles, except that based upon practical usefulness, the size of and position of windows are subordinated to architectural effect. Small sized windows are employed to produce an effect in the façade, in that domestic classic style which was so much in vogue in the early part of this century, and which has left traces upon our school architecture. A frieze, in a classically proportioned house, occupies a band of several feet in width below the eaves, which must be kept sacred from such vulgar uses as that of windows. The frieze may not be actually there, but a place is left for it, a blank ribbon of wood or stone above the brick wall and the window-heads. Classic usage requires a strict subordination of windows, one might almost say, a suppression.

In certain places there prevails the singular custom of making the upper story much higher than the lower. For example, in Rochester, School No. 19, the distance from the top of the glass to the ceiling is 28 inches in the first story and 78 inches in the second. The High School at Binghamton has four stories, the height of which, beginning at the bottom, is respectively 14, 15, 16, 17 feet. This practice is related to the custom of using the upper story for a large hall or assembly, but it has been retained (from habit?) in cases where there is no such hall. It has the advantage of airiness, but the architects have not seized the full advantage of the arrangement by carrying the windows up near the ceiling. A certain loss of light results, which is seriously felt in certain cases, as in that of the High School at Rome in Oneida county (a classic structure).

Glass sliding-doors are still in frequent use in some places, but I am inclined to think that they are going out of fashion. It is doubtless supposed that they give aid in lighting the rooms; but this is very questionable.

During the inspection of school-buildings, conducted under the orders of the Committee on Public Institutions, in 1881, many buildings containing glass sliding-doors were seen, and compared with those of similar plans which have no such partitions. As a result, it has seemed desirable, not merely to express disapproval of the glass partition plan, but to give some illustrations, and explain the reasons.

From a theoretical point of view, we must consider:

1. That the glass in the partition reflects a part of the light and throws it back out of the window.

2. That it absorbs a part.

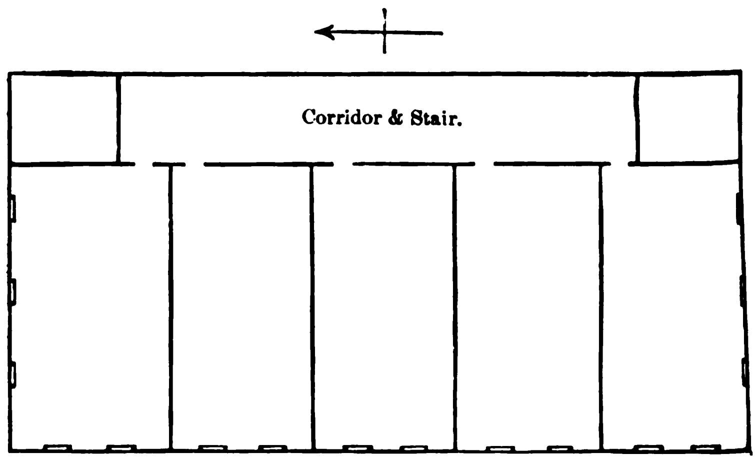


FIG. 17. School No. 13, Rochester, Second floor. Division into five equal rooms by glass partitions. Very poor light and diminished ventilation in three interior rooms.

3. That it allows a part to pass straight through and out by the windows of the opposite side of the room or house. To this add the fact, that in examining the plans of houses where glass partitions are used, we find that there is not generally light enough to supply each separate room supposing the partitions to be solid walls; from which we are entitled to infer that the planners thought that the supply was increased by using glazed partitions. Figure 17 will illustrate this. No one could suppose that the architect intended to illuminate those long slips of rooms by two moderate-sized windows at one end; but in reality the light does come almost wholly from that quarter in all the inner rooms.

4. In brief, the total amount of light available in the case of glass partitions is no greater than in that of white solid partitions. The white wall does not waste any more light than glass does. The light that goes through glass to an inner room is light that is needed in the outer room.

Figure 18 shows a more recent plan, which looks attractive. The middle room of three receives light from the rear and two sides. Why does it not receive enough? The answer is a two-fold one: First, because so much side-light is cut off, and second, because the side-ligh[t is] so distant and slanting.

1. To a person standing in A (see fig. 20) the objects in B seem l[ess] distinct than those in A. A part of the light is thrown back from t[he] glass into A, as we may see by the reflections on the sash. The ceilin[g] and floor of B are darkened by the wooden frame work, and the groove[d] beams in which the doorheads slide. A person at B. notices an increas[e] in the light when the sash is opened.

;ide-light from the window at A cannot be expected to be of much 'ond the width of A. It strikes B too obliquely. The simple rule, wance for ; that no shall be d to throw a horizon- ince greater nce and a height, sup- its head to :e near the The dia- epresents a rooms, each four feet

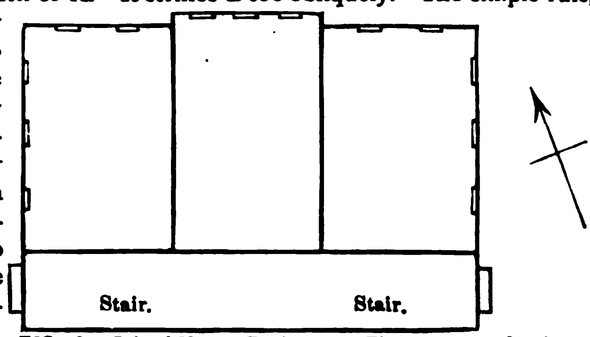
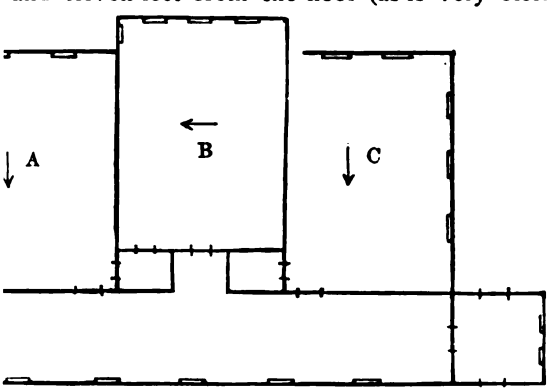


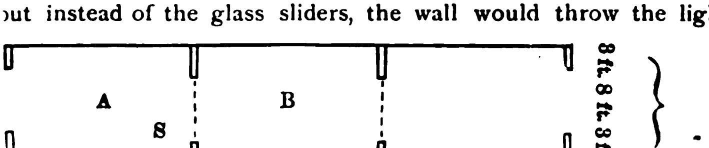
FIG. 18. School No. 24, Rochester. Three rooms 32 feet long, with glass partitions.

id fourteen feet high. The window head is three feet from the and eleven feet from the floor (as is very often the case); the light may be sufficient as far as the mark S on the floor. If the house stands on a large lot with a wide, open outlook, the inner seats, in A, will be well lighted; but in an average street, with houses of moderate size opposite, they will be poorly lighted. A



9. School No. 26, Rochester; built 1879; first floor. Here an evident attempt to remedy a defect in such a plan as that 8. The middle room is of the same size as the others, but windows all at one end; a great gain as compared with No. inferiority of B to A and C is still evident, however.

i of the light in B will be very poor, indeed. Finally, the light that irough from A to B is chiefly lost to A; if a smooth white wall out instead of the glass sliders, the wall would throw the light



o. Diagram of three rooms in Fig. 19, in perpendicular section; open spaces at ht and left represent windows; dotted lines represent glass between rooms.

back upon the desks in A. This part of the light is really needed, and it is most needed just where it comes, at the back of the room

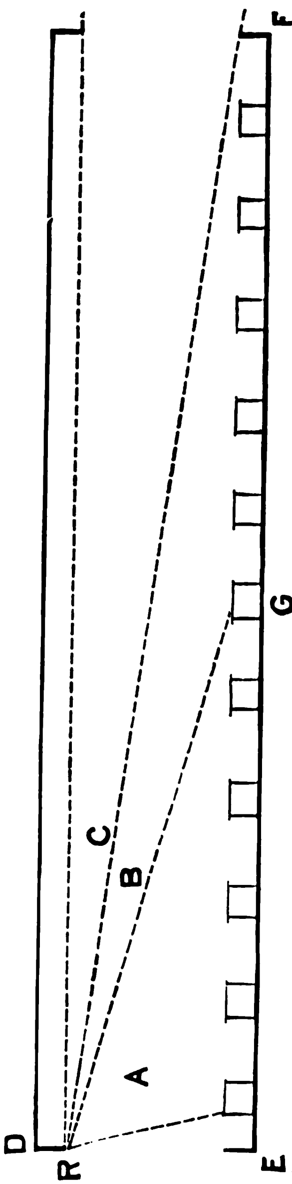


FIG. 22. Perpendicular section of Syracuse High School, from side to side.

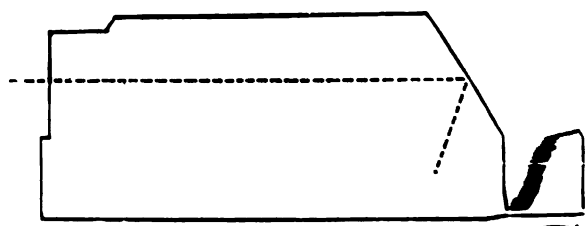


FIG. 21. Cross section of room with sloped inner wall, with a ray of light reflected from wall.

A good deal is gained by slanting the inner wall (where that is feasible) so as to throw the light more directly downward, as in figure 21. The writer has knowledge of one room in the Albany High School which is a favorite with the pupils for this reason. But even an upright wall is of much value as a light giving surface. The ceiling is of great importance in this respect, and must not be cut up by cross-beams; it should be white, while the walls are tinted very slightly in some neutral color.

If the three rooms represented in figure 20 were thrown into one, the result would be like figure 22, which represents one room in the Syracuse High School, seventy-four (74) feet in width (E F), and fourteen feet high (D E). A ray of light is supposed to enter at the top of the left-hand window (R), and to divide into three parts. The first part (A) is ten-twelfths of the whole, and falls on the desks in the left-hand half of the room. One-twelfth (B) passes to the desks in the other half, and the remaining twelfth (C) goes out at the opposite window. The object of the figure is to show how unimportant a fraction of the whole light from any given window reaches the distant parts of such wide room. If a glass partition were set up at G, the amount passing through could not be more than one-sixth of that which is diffused in the left-hand room, even leaving out of the account the obstruction caused by the frames and the glass itself.

By carrying out the idea further, we may enlarge the desk at G, and may represent in figure 23 the extreme slant at which rays of light will strike the desk, so that a small object casts a shadow over the whole lid. In figure 23, however, the light is represented as coming from the direction of the middle of the window, in order to get an average result. In a room thirty-six feet wide, the inside row of desks is in such a position.

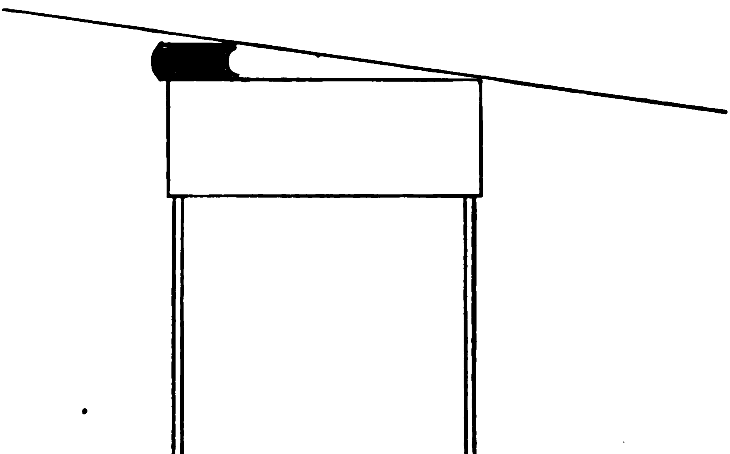


FIG. 23.

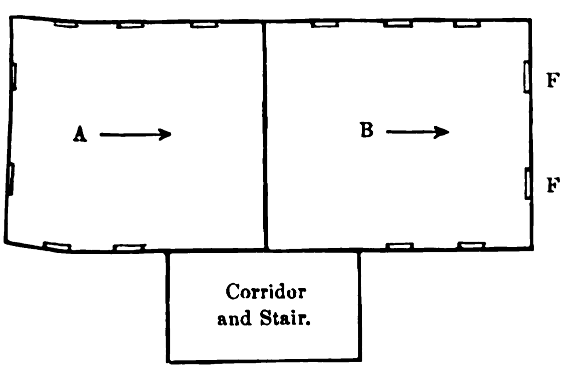


FIG. 24. School at Hoosick Falls.

The most valuable light is that coming from the center and upper part of the room or window. The more perpendicularly it strikes, the better. Therefore, the window-heads ought to be as near the ceiling as possible; that is within six inches or thereabouts.

A few more illustrations of imperfect lighting may profitably be added. Fig. 24 represents a school at Hoosick Falls. The two rooms, which constitute one floor, are each thirty-five by thirty feet in size. A sliding glass partition throws both into one, for the purposes of exercise in common. This presupposes that the scholars face the same way in both rooms. The windows at F F are necessarily closed, and the light in B becomes insufficient, the combined area of the glass equaling one-fourteenth of the floor space. Other instances of facing the light for a simi-

lar reason are shown in figs. 25, 29-32, and others, where, as usual, the arrows show the direction of the facing.

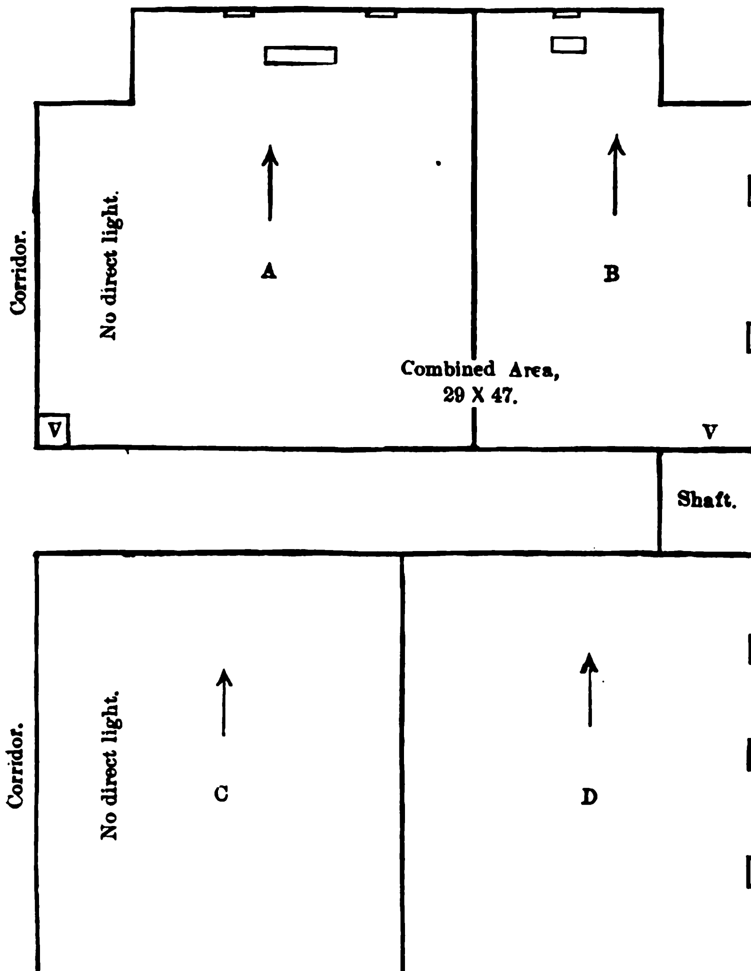


FIG. 25. School No, 10, Rochester, third floor.

Fig. 26, represents four rooms in the upper story of school No. 10, Rochester. The corridor occupies the left hand, but is not given in the drawing. The four rooms are entered by an alley between glass sash-work. The partitions between A and B, C and D, are of glass. A and C are poorly lighted; A especially so, since all the light, with the exception of a little from the windows in B, comes from directly in front. There are, of course, windows on the outer corridor wall; they may be said to be thrown away for the purpose of lighting the rooms, and the same criticism applies to figures 17, 18, 19.

The arrangement is an extremely bad one. Even the shaft (for ven- ation) is so situated as to take the place of one window, and the towers ıdicated by indentations at the corners) take the place of at least one ndow each.

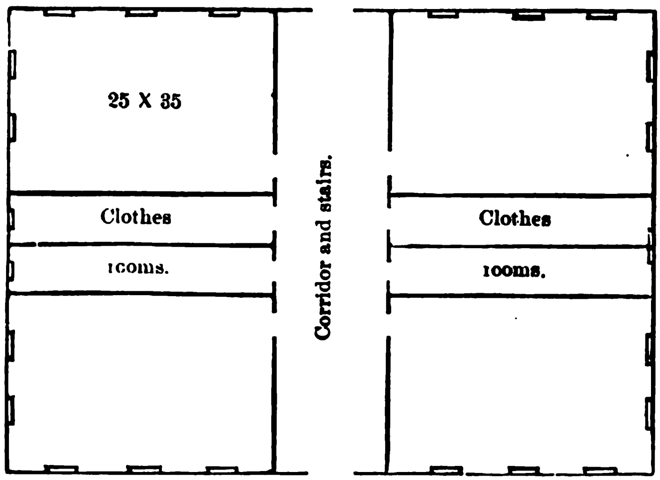


FIG. 26. Type of a school-house with none but corner rooms.

ıs easy to see how this plan might have been changed. The house is arly square, and the dimensions would easily admit of four oblong rooms a floor, with the entry or hall running straight through between. Upon s plan are built schools No. 15, Rochester, and 21, Albany, both at sent fairly well ventilated, owing in large measure to the arrange- nt which gives thorough ventilation of the halls, assigns to each room o exposed surfaces, and does not allow any two class-rooms to come contact The scheme is illustrated in Fig. 26.

The difficulty in the case of corner rooms is, that either the scholars or teacher must face the light. To many teachers this is a serious evil. jury may easily be inflicted on the eye-sight. If the teacher is much ıployed in work with the blackboard, and the maps, and reading-charts, d is more on her feet than in the chair, the difficulty may be overlooked. ıt if obliged to sit while conducting lessons or overseeing study, she ould be protected by a screen. Such a screen is in actual use, and is uch prized in all the rooms of the Albany High School. There are two tterns, one wholly of wood, the other a wooden frame covered with oth and sliding on an iron bar with a heavy foot. (Figs. 27, 28.) They e placed on the desk in front of teacher. The ideal school-room is one th only one exposed side, whereby the most uniform illumination is se- red. (Fig. 8.)

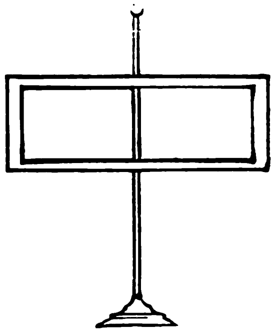


FIG. 27.

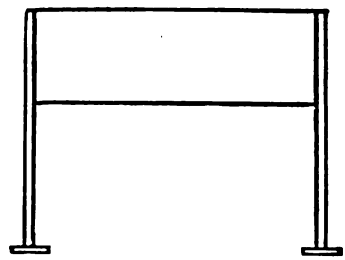


FIG. 28.

Country schools are apt to be incorrectly lighted. But few are so badly off as this octagon (fig. 29), where each scholar faces three windows and stove, or the oblong (fig. 30), where the case is nearly similar.

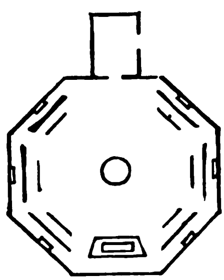


FIG. 29.

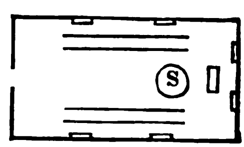


FIG. 30.

The principle that scholars should never face a light when at work is violated in the case of a long room (fig. 31) in the Union school at Schenectady. Here are seated one hundred and fifty scholars of nearly adult size, all facing in one direction. Those who occupy the forward part of the room are under great disadvantages, as the light which comes from the rear is distant, and that in front is near. The room measures sixty-seven feet by twenty-seven feet. The building was originally a college.

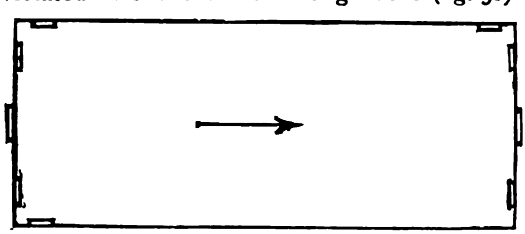


FIG. 31. Schenectady Union School.

In the newest school in Schenectady the scholars turn their backs upon a blank wall and face windows. (Fig. 32.)

From Brockport State Normal School are selected two cases of bad lighting, which is dependent on the great width of the structure. It

would be hard to re-arrange the inner partitions so as to give good lighting. Fig. 33 is a room used for class work, 56 by 34 feet, having all five windows at one end. Fig. 34 gives a room *devoted to drawing*, with the windows similarly placed; it is 34 feet square. And as an instance where the occupants consider the light superfluously abundant, Fig. 35 is a recitation room in the third story, 32 by 18 feet, with five windows, having a glass area = 1-5.3 of the floor area, with a free sky in front. The area of glass in Fig. 33 is 1-16, and that in Fig. 34, 1-9.6 of the floor area. These instances are

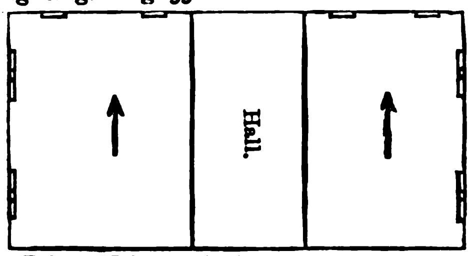


FIG. 32. Schenectady, Park Place. Facing light needlessly.

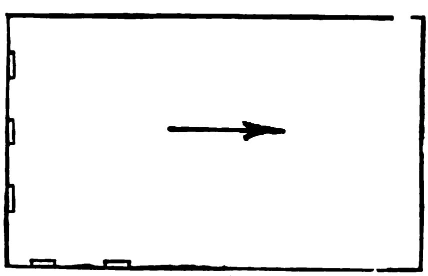


FIG. 33. (Defective lighting.) Room 56x34 with 5 windows at one end. Brockport Normal School. Windows badly placed and insufficient (glass area = 1-16 of floor area).

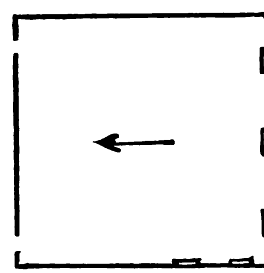


FIG. 34. (Defective lighting.) Room 34 feet square, with 5 windows. Badly placed, insufficient. Brockport Normal School. Used for drawing and writing. (Glass area = 1-9.6 of floor area.)

confirmatory in a general way of the principle that glass surface should equal from 1-5 to 1-6 of the floor surface in all but exceptionally open places.

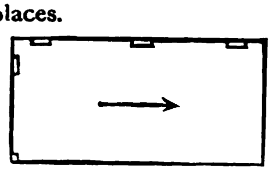


FIG. 35. (Light superabundant.) Room 32x18, windows advantageously placed, glass area = 1-5.3 of floor area, and the room looks fully upon the sky.

Fig. 36 is a room 50 by 35 feet, lighted on three sides. The large platform is placed opposite the door, hence the scholars must face four windows. For the case of this badly arranged room the remedy is simply to reverse the position of the pupils. This would, however, give discomfort to a teacher unless a screen were used.

Fig. 37 is an old building. The lighting of the main room is excessively bad. Nearly one half (the rear 18 feet), has no windows, and the scholars face three windows. It is not feasible to reverse the seats for that would bring the teacher's desk to D, which is quite in the dark and faces three windows. The upper story is curiously divided (fig. 38), with one room of very singular proportions: 8 x 23 feet.

Fig. 39 is a one-story brick school at Brockport. With only three rooms, there are provided three entrances (R, T, W are the vestibules). Room C is badly lighted. Lighting has been sacrificed to the symmetry of the plan. The south side of room C ought to have those windows which could have been accomplished by moving R, S, T, to the left, and making T smaller. Room A has one superfluous window on the right, which embarrasses the occupants.

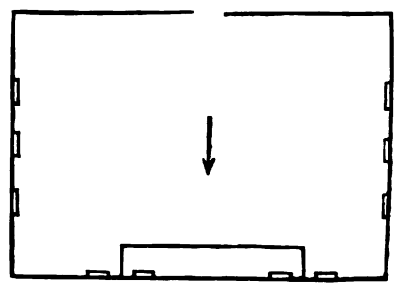


FIG. 36. (Defective lighting.) Room 50 x 35'. Scholars face four windows, which have to be darkened. The width of 15 feet in middle of room is imperfectly lighted by side windows. (Rochester, No. 2.)

The corridor ought not to occupy the side of a house, unless that side is known to be undesirable for furnishing light. Exceptions may be made under fit circumstances. But when a house is placed on a narrow lot, under circumstances which make it even possible that the side lots may be built upon, it is folly to waste the best light (that on the street-front,

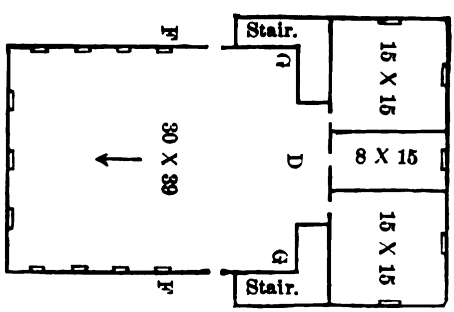


FIG. 37.

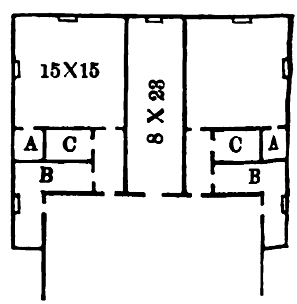


FIG. 38.

in cities, may be called such) by occupying it with corridors. If it be thought necessary to use narrow lots, they should at all events run back to the next street. But the necessity does not exist in any non-metropolitan city.

One of the chief recommendations of a plan like that of fig. 26 is the freedom of exposure to the sun's direct rays. Corner rooms are wholesome to live in, and it seems undesirable to occupy that part of the plan by staircases, as in fig. 40.

It will be a useful exercise for any one who is concerned in the plan for a new school, to take some of the outlines here given, and try to alter them in accordance with just principles. Take fig. 40 with its simple oblong form, and try to redistribute it ; with straight halls going clean through, with corner rooms as many as convenient; with the oblong figure preserved in each room if possible ; with 600 square feet floor to each, or nearly that, and more if wished; with dressing-rooms of sufficient size

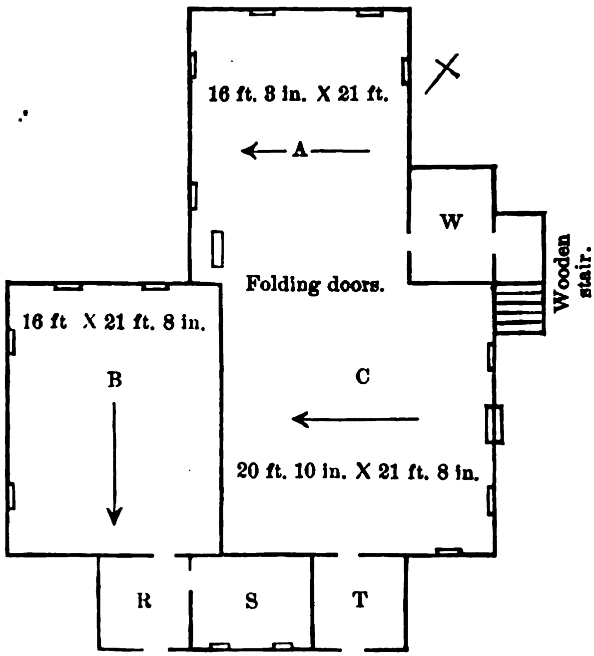


FIG. 39. Brockport Common School, floor plan.

properly lighted; with no room so packed as to touch other rooms more than two sides.

PLAN OF A MODEL SCHOOL-ROOM.

The dimensions of rooms for study should not be excessive in either rection. Very large rooms cannot be lighted from one side, which is esirable to avoid cross-light. If both sides are used for windows, the holars necessarily receive light, one-alf from the right hand and one-half om the left. The former is objec-nable in writing or drawing because e hand throws a shadow on the ge. The ideal room is lighted from e side only (Fig. 8), and its size limited by this condition; for the ght of such a room cannot be ced at more than fourteen feet, and s limits the available width of the om (equals one and one-half times e height of windows) to twenty or twenty-one feet. The width of an le being added on the inner side gives twenty-four feet as the maximum

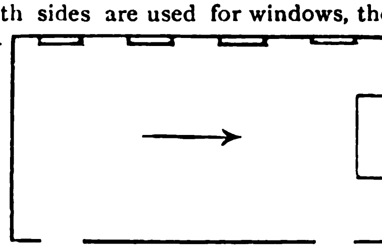


FIG. 40. A room well-shaped for imperceptible ventilation, or for quick change of air when desired. Two doors, four windows. Pupils face in the direction of the arrow.

desirable width for an ordinary school-room. The dimension in the other direction may be greater but is limited by the need of having all the children read words on the blackboard. Thirty-two by twenty-four, and fourteen in height, gives a cubic space of 10,751.

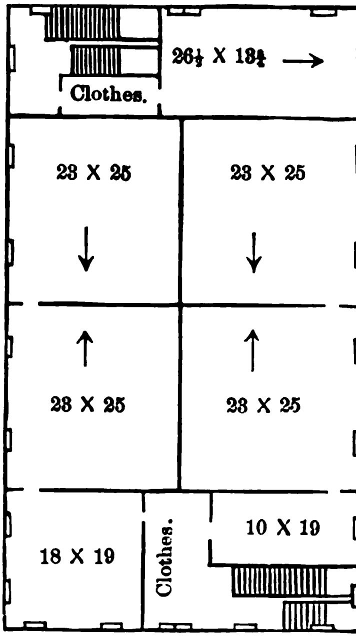


FIG. 40.

The next step is to ascertain how many scholars may safely be placed in the room. That depends on the amount of fresh air that can be introduced. It may be assumed that it will not cause dangerous draughts to bring in enough air (in suitable ways) to change the entire atmosphere once in ten minutes, or six times in an hour. The hourly supply is therefore 64,512 cubic feet of fresh air. Divide this by 1,800, the quantity assumed as required by each schoo'boy, and it follows that thirty-six pupils can be accommodated with sufficient fresh air in that room. In this case each scholar has 300 cubic feet of space, and 21 1-3 square feet of floor-space.

If we assume that air may be admitted more rapidly, viz., so as to change the contents of the room eight times in an hour (which is probably near the maximum of safety), the result is forty-eight pupils and 226 cubic feet of space to each.

If a larger class must be accommodated, the room may be lengthened. A room 25x35 accommodates fifty-four pupils with the above allowance.

The committee of award in the competition for the prize for the best school-house plan (offered by the "Sanitary Engineer") assigned fifteen square feet of floor area as the minimum for each scholar, and the maximum height of rooms as fourteen feet, making a minimum of 210 cubic feet of space with this height, 196 feet with a height of thirteen feet, and so on.

SCHOOL DESKS AND SEATS.

There is difficulty in ascertaining what is wanted in the case of these articles. Some think that ease and a comfortable support for the body constitute the chief object of a seat; they naturally prefer a seat which tilts back a little, or compels the reader to do so. Others wish the habit of sitting upright to be enforced by the construction of the seat and desk; the inferences drawn from this postulate are various, some wishing to do away with chair backs altogether, and others allowing a support only as far up as the middle of the back, while a narrow strip for the spine alone is used in some (foreign) patterns.

The writer would beg to be excused from deciding between these conflicting views. The truth seems to be that it is desirable for children to be taught how to write in an erect attitude, and that certain of the school chairs, with sloped and curved backs, which are now so common in modern schools, do not assist in doing this, but have rather the contrary effect of tempting to slide into a semi-recumbant posture. Such chairs are not the best to write in, however comfortable for reading. Drawing, copying, ciphering, written exercises, writing (spelling) from dictation, writing in copy-books, and the use of dictionaries, all require an upright position. The shape of a Mexican saddle may suggest something when we are trying to fix on the proper school seat. The lower half or third of the trunk is the part which needs firm support, and the lower eight or ten inches of the back-rest is the most important portion.

The desk is used for two very distinct purposes. In *writing* it must be nearly flat, and its edge should project an inch or two over the front edge of the chair (supposed to be of ordinary width), and the height should be convenient, so that the arms may slide easily over it without raising the shoulders. Too great height of the lid is a common fault. In *reading*, however, it is convenient to have the desk lid tilted a good deal to form a suitable book-rest. Desks are now made (very cheap and good) which enable the scholar to make the change at will.

A point much neglected is the height of the seat for little children, who often have to sit with their feet off the floor. Foot-rests are needed in most young classes.

A desk placed too far from the seat compels the pupil to lean the body forward, elbows on the desk, in postures which are apt to become injurious to the symmetry of the body. There should not be room enough to stand between desks and chairs; on the contrary, as before said, the former should overlap the latter.

The development of near-sight is aided by desks, seats and habits of sitting or writing, which bring the head into a bent position, and the eyes close to the paper. These habits of attitude are extremely common, and nothing is more troublesome than the constant effort to correct them. In fact, nature will assert herself in spite of our efforts, and the best plan may be to cut short the time for writing, or to interrupt it by a minute devoted to calisthenics. In fact, protracted sitting, or confinement to any single posture for more than a few minutes is injurious to young children. The circulation is made stagnant. Odd or distorted attitudes become more so, and the effort to maintain a correct posture becomes irksome.

SITE OF THE SCHOOL-HOUSE.

It may not be amiss to call the attention of trustees to the advantages of choosing wholesome, sunny, sheltered spots of ground for school buildings. It cannot be said that their duty is done when they have provided a good house; the surroundings also (as far as can be controlled) ought to be such as will conduce to the moral and physical well-being of children. Low grounds, where mists prevail, and high bleak spots are

alike to be avoided, if practicable. The science of drainage is now so generally understood that it cannot be necessary to have a "wet cellar," except in rare cases; and in such cases the site should not be used. In damp sites, the flow of underground water toward the cellar may be intercepted by a trench containing drain tile outside the foundation, sunk somewhat lower than the level of the cellar floor; the drain communicates with pipes which leads the water elsewhere. Solid cellar-walls coated outside with coal tar may be used. Good asphalt flooring is desirable; common brick is not only liable to be damp, but often grinds to dust under the feet. A trench cut across the floor and communicating with the outer drains will take off the water under the floor. Such a trench may be filled with common stones and covered over.

In small country schools the practice of raising the school floor some two or three feet above the soil is often followed, and is always to be recommended when no cellar is built. In the wall of the sub-floor space openings should be made which should be left open except in cold weather.

An ample space around the school gives dignity to its effect; and it also insures good light — a point which is one of the most difficult to handle properly in large cities. It seems strange that in towns of a hundred thousand population, or even less, schools built a generation ago should now be so completely shut in by new buildings as to lose more than half their light; but such is the fact in more than one place. It is an inexcusable want of forethought to build with only six or a dozen feet of margin, and with no guarantee that the next lot may not soon be occupied with a high building. Every city hopes to grow; and of late years there is encouraging evidence that cities are beginning to draw the logical inference and to protect their schools from crowding. Another point liable to be overlooked is the prospect of a street becoming a great thoroughfare for business. It is a terrible nuisance to teach in a house near a noisy street in hot weather!

It is undesirable to have the building closely shaded by trees, but a neat arrangement of small trees, shrubs, grass, and even flowers, adds greatly to the respect in which the place is held. Walks may be coated with asphalt or laid with North river flags, for comfort.

School Work.

Those charged with the care of children should bear in mind that, while well-directed study is a positive benefit to health, there are certain ways in which the studies of youth are sometimes injurious.

1. *Amount of Work.*— At present there is a general agreement, or something approaching to it, that thirty hours of study and recitation a week is not far from a correct standard for an average High School pupil. In colleges forty hours are entirely compatible with health. In schools below the grade of High School, five hours a day for five days in the week is a standard, which should be *greatly lessened in the case of the youngest pupils.* Home study, for classes averaging less than twelve years of age, is in many places thought undesirable.

e points are readily understood by experienced teachers, and their ment may be left in non-medical hands. At any rate the writer ot offer further discussion of them.

length of sessions; physical exercise; and recesses, may fall more ' under medical direction. It is quite customary for schools of a ade to sit five hours continuously, with one or two short recesses. ler the pupils are the better they are suited with this plan; and s are almost always pleased with it, as regards their own comfort. ered as a suggestion, that, for children under ten years of age, the unsuitable, both as requiring too *much* and too *continuous* appli- The long session, in any case, ought to be broken up into s of not more than about fifty minutes each. At the end of every break should be made, which after the first and third hours should of calisthenics, the pupils of course rising, and the windows being as much as the season allows during the exercise. After the and fourth hours, recesses of ten or twenty minutes, for play and are desirable. During the latter, no child should be allowed to in the room; all should go to a play-room (light, airy and com- :) or play-ground, under a teacher's charge, while the room is ghly aired.

ibolition of recesses has become a popular plan of late. When l has two daily sessions, it may be an advantage to shorten them way — not dispensing, however, with a five minutes' pause in the of each session. For little children, frequent recesses and short s (three or four hours a day in all) are suitable.

njurious effects of the use of *tobacco*, and other forms of vicious nce, are considerable, and often strike a teacher's eye. The in- , mental inability and nervous derangement which they cause are But there is another cause, much easier to ascertain, and much mediable, which is perhaps doing more harm than these or than tudy." I refer to improper habits of diet, which in the case of children, include the eating of candy and cake at lunch; neglect g lunch for long sessions of five hours; occasionally or frequently g breakfast; and drinking immoderately of tea or coffee, some- t breakfast, with absolutely no food to accompany it. Would it eved that an old and prosperous Academy allows (or did lately a vendor of candy and pie to occupy a part of its building for the e of selling these articles to the children at lunch? Is it known, or en inquired about, how many children rise in the morning after

ıts of dissipation and poor sleep, and sit at the breakfast table only g enough to swallow their tea — having "no appetite" for food? ey go to school, too, with no proper provision; they have money to y trash, instead of a wholesome lunch; they "have no stomach for the ;ht" of school work, and their whole behavior shows their unfitness ›r work. When these habits are connected with a five-hours' session, o that scholars may practically have to fast until three o'clock P. M., the :ffect upon the health is disastrous. The evil is definite and unquestionable and the attention of school-authorities is earnestly invited to it.— Very few children are likely to be injured by strong liquors during the school age; but a great many are harmed by strong tea and coffee — articles of doubtful use for minors.

It is well to mention the fact that over-work is particularly dangerous at periods of rapid bodily growth; or while the system has only partially recovered from the shock of severe illness; or in children whose nerves are ill-balanced, as in the case of a tendency to chorea (St. Vitus' Dance).

In the same way, over-work must be avoided with especial care at the age of sexual development. This subject is exceedingly important, and has already attracted great attention.

Due credit being given for each of these points, it remains true that young people inflict on themselves, in the pursuit of social amusement and the practice of accomplishments like piano playing, an amount of strain which in many cases is the sole and sufficient cause of break-down. These matters are beyond the teacher's control.

But in one point it seems to the writer that school authorities are not doing their duty, namely, the physical training of young people, especially those of the female sex. Not that school governors or trustees are to blame, but rather that public sentiment is not sufficiently awakened to the need of such training. The first step toward a right training may be taken, however, by any teacher who understands ordinary calisthenics, and can get permission to devote half an hour of solid time two or three times a week to it. The second step *costs money*, and implies the employment of trained instructors, who ought to have good salaries for their laborious profession. It seems as if there were no other remedy for the terrible want of physical exercise and development which is visible in our own cities, especially among girls.

Finally, there is no doubt that many teachers are severelly strained by their work. School boards ought to consider this point in reference both to present programmes, and prospective improvements — the latter often involving increased labor on the part of teachers. Modern methods of teaching involve much more active and energetic work than the old way. Teachers of music and drawing are liable to be either carried away with enthusiasm beyond the limit of their strength, or else to be fretted and depressed by the constant contact with inartistic natures. In short, the teacher's life is one which is fully exposed to the dangers of overwork about which so much is said in the case of children.

REPORT UPON THE PUBLIC SCHOOLS OF SARATOGA SPA, N. Y.

[By RICHARD PRESCOTT, M. E., Sanitary Engineer.]

May 9, 1885.

To the Secretary of the State Board of Health, Albany, N. Y.:

SIR — In accordance with your request, I have inspected the public schools of Saratoga Spa, N. Y., and have the honor to submit the following report on their sanitary condition:

There are nine buildings used for school purposes, being Nos. 1 to 7 inclusive, the High School, and a building used by the junior department of No. 3. Six of these buildings, viz., High School and Nos. 1, 3, 4, 6 and 7 are brick, and the others, Nos. 2 and 5 and the annex to No. 3 are frame structures. The High School and Nos. 1 (in part), 6 and 7 are buildings very well adapted to their use, but the others are deficient in many respects, sanitarily considered, as will be referred to in another place. The inspection of these various school buildings furnished grounds for the following conclusions.

A. SEATING CAPACITY.

Taking as a standard the minimum limit of fifteen square feet floor area per pupil adopted by the *New York Sanitary Engineer* committee of judges on prize school plans, and assuming the number of pupils to be represented by the seating capacity of the rooms, it appears that schools Nos. 1, 3, 4 and 7 are over-crowded. Thus in No. 1, in the B primary, the area is 10.2 square feet; in the A primary, 9.7 square feet; in the C junior, 13.3 square feet; in the B junior, 13.7 square feet; in the A junior 13.3 square feet; and in the grammar, 14.7 square feet. It is only fair to state that considering the number of pupils present at the time of the inspection, or the average number in attendance, or even the maximum of attendance for the year, there was not a single case of overcrowding; nevertheless seats are provided in sufficient numbers to exceed the limit as given above.

B. LIGHTING.

The total area of window surface for a school-room should be not less than one-fifth the floor area, and would better be considerably in excess of this limit. In the schools and departments under discussion the relative proportions are as follows:

School No. 1	1–20; 1–9; 1–8
School No. 2	1–6; 1–8
School No. 3	1–8; 1–5; 1–9

School No. 4	1–6; 1–7; 1–7
School No. 5	1–12
School No. 6	1–5
School No. 7	1–9; 1–10
High School	1–10
Annex to No. 3	1–4

This is certainly a very unfavorable showing, and the matter is made more serious by the fact that, except in the high school, the windows are too low, that is, do not extend as near to the ceiling as they should. In the beautiful high school, the windows of the main study hall are high enough, but, unfortunately, the architect has seen fit to fill the upper fourth of each window with ornamental stained glass. This is the more astonishing in view of the fact that the building has been erected less than two years.

In most of the schools the pupils are seated so that the light comes from the back and left, or from the back and both sides. In a few, the light comes from the back and right, and in two rooms the pupils face the windows.

C. Heating.

Nos. 1 (in part), 2, 3, 5, 6 and 7 and the annex to No. 3 are heated by ordinary stoves which are placed at distances from nearest seats varying from two feet in No. 3, grammar, to five feet in No. 3, annex. In two cases only the stoves were provided with screens to shield the pupils in the vicinity.

No. 1 (in part) is heated by Ruttan stove-furnaces (see paragraph on ventilation).

No. 4 and the high school are heated by steam; No. 4 having direct radiation throughout and the high school a combination of direct and indirect. Several of the rooms in No. 4 have decidedly more radiating surface than is required. The arrangement, too, is open to criticism, since in several instances (in No. 4) individual coils are placed partly in one room and partly in another.

D. Ventilation.

With few exceptions, the schools inspected are without means for ventilation, other than opening doors and windows. Nos. 1 (in part), 2, 3 (and annex), and 5 are without any ventilating apparatus; No. 4 has a number — five or six to each room — of six inch circular registers at top and bottom, opening, probably, into flues, the upper terminal of which could not be found, although they may probably open into the roof space; at all events, they are entirely useless and no attention is paid to them. Even if there were good flues with a good draught, the registers are absurdly small. Nos. 6 and 7 are provided with registers six inches by seven inches at top and bottom opening into brick flues, four inches by sixteen inches that communicate with the roof space. In No. 6 there are two six in[illegible] openings in one gable, while in No. 7 there is no opening. In both schools the upper registers have no cords for opening and shutting, and, as matter of fact, are never touched. The lower registers are "fixed" in the

morning by the janitors and are not intentionally disturbed. Certainly it could make but little difference with the air in these schools whether the registers were open or shut.

Three rooms in No. 1 are heated and ventilated on the Ruttan system. In each a hot air furnace supplies fresh air drawn from out of doors, while through a register in the floor the foul air is drawn into a flue heated by the furnace smoke pipe. In two of the rooms the foul air register is located at the opposite end of the room to that in which the furnace is situated, and opens into the general space beneath the floor — these rooms being on first or ground floor — and this space communicates with the ventilating chimney. For some inexplicable reason, openings have been made through the walls, connecting these sub-spaces with the outer air, thus destroying the ventilating process and seriously diminishing the heating efficiency of the apparatus. The location of the foul air registers is faulty; they should be close to the furnace in order to realize the greatest benefit from the system. In the third room — a second-story room — the system works well and is deficient in size only.

In the high school, each room has one or more indirect heating stacks supplying fresh warm air, and a number of foul air registers, ten inches by fourteen inches, at top and bottom, opening into narrow brick flues, some of which communicate with a chimney fifteen inches by twenty-six inches, and the rest with the roof space. In the cresting on the ridge, a number of small openings give egress to the foul air. This system of ventilation is extremely imperfect, and in certain cases of calm weather must become nearly inoperative. The supply part of the system is all right — could not be improved, but the equally important part of the removal of vitiated air is at fault. In the first place, the flues are in outside walls and are not heated; this of itself is a serious obstacle, since the column of air in a flue must be warm before it will rise; and in the second place, the general roof space acts as a partial cover to the flues, tending to diminish the velocity of the rising column. In two rooms the indirect stacks are supplemented by "Jackson" grates, which is, theoretically at any rate, a good plan. The grates were not in operation at the time of the inspection. A remarkable feature in the two rooms just referred to is that the registers to the indirect stacks are in the floor *under the settees* and consequently more or less covered by the clothing and persons of the pupils.

E. WATER CLOSETS AND PRIVIES.

The high school is provided with automatic flushing hoppers, each one having its one independent cistern, and all are in most excellent condition. I have never seen in schools elsewhere more satisfactory lavatory apparatus environment than in this Saratoga High School, the concrete floors, the partitions, walls, seats, all perfectly clean and neat, the apparatus all really working, the rooms spacious, light and well ventilated — altogether I consider it a model establishment.

All the other schools are provided with privies, and all in an abominable condition. In most cases the girls' privies are clean as far as the

wood work is concerned, but the boys' privies are foul. All have shallow vaults and are usually furnished with a draw box. The boxes and vaults are cleaned at frequent intervals, and chloride of lime is used with no sparing hand, but a privy is a privy still and nothing more. In two instances the privies are very close to the schools; at No. 7, for instance, it is but nine feet six inches from the part of the building used by the junior department and fully commanded by the windows of this room.

Such is the condition of the Saratoga schools with reference to the points named; and it remains for me to suggest for your consideration such improvements as the circumstances indicate.

1. It will be well to reduce the number of seats in the different rooms until there shall be not less than fifteen square feet floor surface for each seat. This will be accomplished in some cases by exchanging the double seats for single ones.

2. The small, old fashioned windows in some of the schools should be replaced with longer ones extending as close to the ceiling as possible. I strongly urge the propriety of removing the stained glass from the high school windows and setting plain glass in its place. The room may not be as beautiful, but the change will be very beneficial to the pupils.

In the two rooms where the pupils face the windows the seats should be changed without delay.

3. The heating and ventilating should be parts of the same system, and my recommendations will accordingly be based on that law. In No. 1, chart and C primary rooms, where the Ruttan system is used, I advise changing the position of the foul air registers, and opening them directly into the ventilating chimney at the same time cutting off all communication between the chimney and the sub-space.

In all those school-rooms using stoves, I recommend the employment of portable furnaces of suitable sizes, taking fresh air from out of doors, while the removal of the vitiated air would be accomplished by running the stove pipe from the furnace up through a ventilating shaft formed of wood and lined with tin. Let there be an Emerson cowl at top of shaft, and let the smoke pipe extend through this cowl and be itself fitted with a small Emerson or with a "Globe" ventilator.

The opening from the room into this shaft should be at the floor level and as near the furnace as possible. The area of the shaft would depend upon its height and the number of pupils in the room. The shafts in schools having more than one room may be clustered and the partitions made of tin alone. If it should be deemed unadvisable by the school authorities to carry out this plan, I suggest that the stoves be jacketed with galvanized iron, leaving a clear space of about six inches, and let the enclosed space be connected with the outer air. This substitute will not give efficient ventilation, of course, but it will introduce fresh air, and will make the distribution of heat more nearly uniform.

The problem of ventilating school No. 4 is decidedly more difficult of solution than is presented by any other school in the place, for the building is already piped for direct radiation, is of very large lateral dimensions, and the three stories are entirely unlike in plan. I submit the following

plan of treatment as one that will certainly be successful, although rather expensive.

Let there be erected at each rear corner of the building a brick shaft, one to serve as fresh air shaft, and the other as foul air shaft. Carry the boiler smoke pipe up through the foul air shaft, which is to be capped with an Emerson cowl. The fresh air shaft is to be capped with an intake cowl, and will communicate by branch ducts of tin or galvanized iron, running through cellar, with the indirect stacks. Let there be a small indirect stack for each study room and a tin hot-air pipe extending from the stack to the room. Let there be also a tin pipe extending down from each study room and communicating finally with the foul air shaft. In connection with these changes, the amount of direct radiation in the rooms thus ventilated should be reduced proportionately to the heat introduced with the fresh air.

In the case of the high school, the flues in the walls that now open into the general roof space should be connected at top with two or more flues extending through roof, heated by steam pipes and covered with Emerson cowls.

4. In the matter of water-closets and privies radical and sweeping changes are imperatively demanded. I believe that the privy is an institution nowhere else as strongly to be condemned as when forming an adjunct to a school house, and it is an abomination in any place.

In the basement of school No. 4 there are full facilities for setting up lavatories such as are used in the high school. I strongly advise that these lavatories be duplicated in No. 4, or else that automatic latrines be used. The other schools may be divided into two classes; those located near public water supply and sewers and those not thus situated. For the first class I advise latrines with automatic flushing attachment, placed in an inclosure warmed by a stove.

The present privy inclosures may in most cases be adapted to the new plan with but trifling alterations. The heat from the stove pipe may be used to ventilate the inclosures. For the second class, I recommend a modification of the common dry earth closet as follows: Let there be a capacious box, or bin, attached to the privy building to contain dry coal ashes, and let there be a removal box under the seats. Then let it be the imperative duty of the janitor, not less than twice daily, to cover all excrement with a layer of ashes at least two or three inches in depth, taking care to keep the contents of the box approximately level.

In closing this report I venture to suggest that the Board of Public Instruction would be benefited as would also the teachers and pupils of the schools, if the teachers had brought directly to their attention the general physical principles governing the matter of ventilation.

I desire to express my appreciation of the kindness of Messrs. Cohen, Eddy and Olmstead, school commissioners, who, in the absence of the superintendent of schools, accompanied me to the various schools and rendered much valuable assistance.

All of which is respectfully submitted,

RICHARD RRESCOTT,

Sanitary Engineer.

SUGGESTIONS BY DR. ALFRED L. CARROLL.

Assuming that the number of seats in a school-room represents the number of pupils whom it is intended to admit, the provision for cubic space in all the schools described by Mr. Prescott is insufficient, and in some of them dangerously so. The minimum of fifteen square feet of floor-space, with a ceiling-height of even twelve feet, would allow but 180 cubic feet for each inmate, and it is practically impossible by any ordinary methods of ventilation to maintain reasonable purity of air in a space of such dimensions. The old theory that children needed less pure air than adults is now generally abandoned, and, even where rooms are occupied for only a few hours, at least 2,500 cubic feet of air per hour should be supplied for each person. Most modern sanitarians advise that 250 cubic feet should be the minimum allotment per capita in schools, and this would demand an entire change of the air of the room ten times in each hour to satisfy the most moderate requirements of healthy respiration — a demand which no common mechanical device can fulfill in cold weather. It is thus evident that, under the most favorable circumstances, the atmosphere of school-rooms is less oxygenated than would be permissible for continuous occupation, and for this reason exceptional care is needed to preserve purity of the environment and to prevent access of extraneous contamination from faulty conservancy-methods or other sources of pollution of soil or air. But in most of the schools mentioned in Mr. Prescott's report there is absolutely no provision for change of air except when the warm season may permit aeration by open windows and doors, and in the few instances where artificial ventilating appliances have been introduced, they are either inoperative or, at best, inadequate. To accomplish the end of indoor ventilation it is necessary not only to furnish means for the admission of a sufficient quantity of pure air at a proper temperature, but also for the removal of a corresponding amount of air fouled by respiration and organic effluvia; indeed, the extraction of the foul air is the most important part of the problem to be solved in the majority of instances; and under any system adopted the outlets should equal the inlets in their combined area, which, supposing a forced movement of the air at the rate of from six to eight linear feet per second, should average a square foot for every eight or twelve inmates. It is true that few, even of the best constructed schools, allow more than half of this air supply; but it is nevertheless desirable that the above-named desiderata in respect of cubic space and fresh air supply should be aimed at in all future construction or improvements. It is, moreover, to be borne in mind that the incoming air must be distributed throughout the room so as neither to leave stagnant places, on the one hand, nor, on the other, to create too great variations of the temperature in different parts,

which should be maintained between sixty-six and seventy degrees Fahrenheit.

A "rough-and-ready" mode of testing the impurity of the atmosphere of a room arising from respiration, and one which might easily and advantageously be employed by teachers from time to time, especially toward the close of school-hours, rests on the deposit caused by carbonic acid in lime-water. Not that carbonic acid in itself is dangerous in even larger quantity than is present in an ill-ventilated room, but that its presence, from respiration, is indicative of the corresponding volatilized organic emanations from the body which are directly injurious. Let a transparent bottle of about ten and one-half ounce capacity, which can be procured from almost any apothecary, be filled with the air of the room (this may be effected by first filling it with water and emptying within the room) introduce a tablespoonful of clear lime-water and shake it for a few seconds; if the lime-water be rendered turbid, the atmosphere may be assumed to be unfit for healthy breathing. This method is, of course, not scientifically accurate but it possesses the merit of cheapness and simplicity.

The mechanical means of carrying out the general principles of ventilation are various, and whilst the particular plans suggested by Mr. Prescott would probably be well adapted to the needs of the buildings described, the choice is by no means to be limited to one system, but in all such cases the commissioners or trustees of schools and other public buildings, knowing the ends to be attained, should be guided by the practical advice of a competent sanitary engineer in the adoption of a suitable system for their attainment, each problem having to be considered in relation to its own distinctive circumstances.

As regards lighting, Mr. Prescott's criticisms and recommendations deserve approval. It is desirable that the conjoined area of windows should be not less than one-fourth of the floor-space, and that, as far as practicable, the light should come from the left and above. At all events, no desks should be placed facing the windows, and cross-lights should be avoided. If any alteration be made in the seating arrangements, it would be advisable to provide for an adaptation of the relative heights of chairs and desks to the size of the pupils. Seats which can be raised or lowered may be procured at very reasonable cost.

Mr. Prescott's suggestions concerning the conservancy-systems seem to be the simplest and least expensive that could be devised for their purpose, and there can be no doubt that the privies described by him should be immediately replaced by safe and more civilized appliances.

SEVENTH

ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF

NEW YORK.

TRANSMITTED TO THE LEGISLATURE JANUARY 19, 1887.

ALBANY:
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1887.

STATE OF NEW YORK.

No. 37.

IN ASSEMBLY,

JANUARY 19, 1887.

SEVENTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH.

STATE OF NEW YORK:

EXECUTIVE CHAMBER,
January 19, 1887.

To the Legislature:

I have the honor to transmit herewith the Annual Report of the State Commissioners of Health.

DAVID B. HILL.

THE STATE BOARD OF HEALTH OF NEW YORK.

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FREDERICK CARMAN, - - *Assistant Secretary, Albany.*

STATE SUPERINTENDENT OF REGISTRATION AND VITAL STATISTICS.

DR. LEWIS BALCH, - - *As Secretary of the Board.*

CONTENTS.

REPORT.

ALBANY, *January* 18, 1887.

To his Excellency DAVID B. HILL,
Governor of the State of New York:

SIR. — The Seventh Annual Report of the State Board of Health is herewith presented. The efforts of the Board during the past year have been in organizing and strengthening local boards; in perfecting the State system of registration of vital statistics; in responding to appeals from localities for aid in correcting insanitary conditions, especially in the matter of drainage, sewerage and water supplies; also in the administration of the laws to prevent the adulteration of food and drugs and to regulate the standard of illuminating oils. A special inquiry has also been made into the sanitary condition of the public schools, to which further reference will be made.

Chapter 270 of the Laws of 1885 makes it obligatory upon every town and incorporated village to have its own board of health and also upon every city in the State, with the exception of New York, Buffalo, Albany, Yonkers and Brooklyn, which are exempt from the provisions of the act. It prescribes how these boards shall be constituted and then specifically places upon each certain duties in reference to the public health and the registration of vital statistics, providing ample means and power for their faithful discharge.

The State Board is given a certain supervisory jurisdiction over local boards and may call any of them to convene when the public interest so requires. Each board is required to make complete the registration of vital statistics within its jurisdiction and to secure the forwarding of the certificates of births, deaths and marriages occurring therein to the State Bureau after local registration. To have all these local boards thus provided for fully organized, and in communication with the central office, and discharging the functions for which they were created, is the aim of the State

Board of Health. Substantial progress has been made in the direction during the past year, constant effort being put forth to organize new boards and to strengthen and add to the efficiency of those already existing.

As will be seen by reference to the report in the Appendix, the State Bureau has been receiving much larger and fuller returns of births, deaths and marriages during the past year than during any previous year, showing increased activity on the part of local boards of health. The law is so plainly worded that there can be no reason for a local board failing to secure accurate vital returns. No body can be removed for interment without a burial permit issued by the local office, and no burial permit can be legally issued unless there is produced a certificate of death signed by the physician in charge or by the coroner in case there has been no physician present. On the undertaker, as the person who has most to do with the deceased, is placed the duty of securing this death certificate and filing it in the office of the local registrar. So in the case of a birth, it is made the duty of the parent or guardian to see that it is properly reported, while an important change has been effected in the law regarding marriages which places the primary responsibility of reporting a marriage upon the groom instead of upon the clergyman as heretofore. This branch of registration has been the most difficult to perfect, but since the new law has gone into operation and the obligation placed where it properly belongs, much better returns have been received at the State Bureau.

The importance of registration branch of the Board's service can hardly be overrated. Its value is finding daily illustration in applications to the bureau for certified copies of deaths and marriages needed in legal suits, in disputes concerning insurance and regarding the inheritance of property.

Since 1884 the Board has issued a monthly bulletin of mortality, which has been continued through the year. The plan adopted seems to be the best that can be devised for the purpose, and it enables the presentation each month of a great mass of statistics upon a subject of extreme interest to students of sanitary science, and also an array of practical facts of constant value in the effective administration of the health affairs of the State. It includes reports, not only from the portions of the State under the super-

vision of this Board, but also from the five cities which are by law exempted from its control. In 1885 about 80,000 deaths were reported in the bulletin, together with their causes; for 1886 more than 85,000 deaths have been recorded. This increase is due to fuller reports, not to an increased death rate. For the eleven months, the reports of which are alone in at the time of this writing, the death rate from zymotic or preventable diseases is a little lower than that of 1885, being 217.82 deaths per thousand total mortality against 222.17 in 1885. There were thirty-four deaths from small-pox during this time, all but two of which occurred in the large cities of New York and Brooklyn. From typhoid fever the death ratio is about the same as in 1885; from diarrhœal diseases it is a little less; from croup and diphtheria, which have prevailed extensively in many localities, the death rate has been considerably larger than in 1885. Diphtheria, more than any other disease, is a measure of domiciliary unhealthfulness, and it is in the direction of remedying its causes that much remains to be done throughout this State. The ratio of deaths from consumption is not materially different from that of last year; of deaths from acute respiratory diseases, which prevailed so extensively in the early months of last year, it is much less.

The bulletin exhibits, on the whole, a favorable condition of health for the year, and also shows increased activity on the part of local boards of health.

SEWERAGE AND DRAINAGE.

The past year has been prolific in requests for sewerage and drainage, and though the policy of the Board was early established, that localities seeking expert aid should be willing to defray the purely expert part of the expenses, this has not in any sense checked the applications to the office. Several localities having obtained legislation authorizing the putting in of new systems of drainage and sewerage were anxious to have the engineer come recommended by the Board, there being a general fear lest incompetent persons should be employed, or those who would saddle them with unnecessary expenses.

The work of the Board in this direction will be found in the proper chapter in the Appendix. The relation of good drainage and sewerage to healthfulness of localities seem no longer to be

questioned, and the impossibility of communities continuing long without these appliances of civilization, or living as their fathers did, is now very generally recognized. There is a growing feeling that the first consideration in selecting a site for a public building or a home is its facilities for drainage, and the sanitary value of this important branch of public economy is at length beginning to be appreciated.

WATER SUPPLIES.

Not second in importance to good drainage and sewerage is the question of a pure and wholesome supply of potable water. The experience of the Board shows that the demand for this is wide-spread throughout the State, while the ease of getting it is by no means commensurate with the need. So many places have supplies more or less polluted with sewage, that what is regarded as a pure and wholesome water for potable purposes is likely to be complicated with the question, What is as good as the average for the great cities and villages of the State? and where water supplies are questioned and controversies arise frequently chemists are pressed into service to prove that the supply is as good, if not better, than that found in most populous centers. But the standard of a pure water should remain fixed, whatever may be the character of the supplies in large cities, and the exclusion therefrom of all excrementitious matter should be rigidly insisted upon as an essential condition of purity.

DRUGS.

In the examination of drugs it has been sought to administer the law impartially. The drugs have been classed as "good," "fair," or "inferior," according as they fully met the requirements of the pharmacopœia, fell slightly below it in some unimportant particular, or were manifestly inferior. It has been found that retailers, where inferior articles were purchased, endeavored to justify their sale by claiming that they were the preparations of reputable dealers, and in some instances, it is believed, inferior articles were put into packages bearing the name of leading pharmacists in order to help on sale. The Board, however, disclaims all knowledge of the wholesaler and simply holds the retailer responsible for what he sells.

Interesting correspondence has been had with manufacturers, and the Board has found on all sides a disposition to sustain it in

its efforts to secure that only pure drugs be put upon the market. Where the analysis of the chemist showed an article to fall below pharmacopœial requirements, a system of notification has been adopted, the Board resolving that two such notices shall first be served upon the dealer before publicity is given to the fact, or any legal measures for punishment resorted to. This system has worked admirably. Occasionally a complaint has been received, but few of them have been well founded, and in all instances where the Board discovered its course could be improved, suggestions were at once acted upon.

The method employed by the Board for administering the law is certainly the cheapest that could be adopted, and the results are confidently expected to be beneficial to the State. Its policy has been to select for examination a limited number of articles sufficiently varied to thoroughly test the condition of the market, those most likely to be adulterated, or to be deteriorated by age, or to be inferior substitutes being preferred. The reports of the analysts in the Appendix will give the details of their work.

It is proposed during the coming year to adhere to the same general plan and collect fresh samples from druggists where inferior articles have already been purchased, with a view to noting whether any improvement has been effected. It is evident to all that what the Board desires is that good drugs may be placed upon the market, and it has conducted its investigations in such a way as to interfere with no business interests and to give all an opportunity to conform cheerfully to the reasonable requirements of the law.

FOOD.

The examination of articles of food, to test their quality, has been conducted in the same manner as that of the drugs. The details of the work will be found in the Appendix. The spices were found very much adulterated, though not harmfully so. A farinaceous substance is ground up and mixed in with the ground spices in various percentages. This was sought to be defended on the ground that it cheapens the article. Manifestly the claim is untenable; for if a person buys a pound of ground pepper, which only contains fifty per cent pepper, he does not get it any cheaper, even though it were sold to him at half the cost of a pound of pure spice.

The cream tartar was found most generally adulterated. Out of

205 samples examined only fifty-three were pure, and one brand contained a poison, oxalic acid, the percentage being a little less than five per cent. Means have been taken to stop the sale of this poisoned article and to trace it to its proper source. The fifty-three samples shown to be pure the analyst found of a high degree of purity, and he speaks hopefully of a new and important process of manufacturing this useful article which promies well. Most of the adulterated samples were purchased in retail groceries.

The Board intends to pursue the same policy with reference to food articles as to drugs.

SCHOOL HYGIENE.

In 1881 the Board undertook some work with the view of improving the sanitary condition of the public schools of the State. An expert was employed to visit a limited number and to prepare a report upon the conditions found, and on the general subject of school hygiene. The report covered the essentials of such places, including lighting, heating, ventilation, arrangement of desks and windows and all that pertained generally to the hygiene of children. Two editions of this report were printed and exhausted, and much interest excited throughout the State. Last year the Board endeavored to follow up its earlier effort and to ascertain exactly the present condition of the schools. For this purpose a blank was prepared asking a few simple questions which, when answered, would put the office in possession of sufficient data to estimate pretty accurately the condition of affairs. These blanks were addressed to the health officers of the various town, city and village boards of health, each health officer reporting for his own district. The plan has been highly successful. The point has been gained of awakening the interest of each local board of health in the schools within its sanitary jurisdiction and information derived, carrying with it the weight of an official report from local health organizations. It thus enables the State Board to co-operate with local boards with reference to remedies.

The tabulation of these returns is printed in the Appendix, together with some comments thereon. This exhibit shows the urgent need of some legislation whereby trustees of common schools should be forced to put the educational buildings with which they are intrusted in a proper sanitary condition, and to

APPENDIX

TO THE

Seventh Annual Report

OF THE

STATE BOARD OF HEALTH.

REPORT OF THE EXECUTIVE COMMITTEE.

SPECIAL EXPERT AND TEMPORARY SERVICE.

1885.		
Oct. 10.	Brace M. Gallien, for engrossing 15 pages, birth register, vol. vi..................	$15 00
	James T. Gardiner, for services as consulting engineer, 6 days, at $15............	90 00
22.	L. W. Pratt, for engrossing 62 pages marriage register, liber v. from page 124 to page 185, inclusive, at $1.25	77 50
	I. L. Carman, for engrossing 24 pages marriage register, liber vi. from page 25 to page 48, inclusive, at $1.25............	30 00
22.	Horace Andrews, for services inspecting and reporting upon Cove nuisance at Rhinebeck, 2 days; expenses	23 26
Nov. 2.	Anna L. Mattimore, for arranging 333 pages cards, death index and indexing and type-writing	98 70
18.	Horace Andrews, C. E., for examining nuisances in township of Florida, Montgomery county; for expenses	11 69
	Isabel L. Carman, for engrossing 21 pages marriage register, liber vi. to and including page 69, at $1.25; for engrossing 15 pages do to page 84, inclusive	45 00
Dec. 3.	Brace M. Gallien, for engrossing 35 to 126 or 91 pages of delayed births...........	91 00
	Anna L. Mattimore, for arranging 138 pages of cards for death index; for writing same in index; for writing 109 pages of index cards, vol. viii, deaths; for type-writing.........................	56 84
14.	Horace Andrews, for expert services at Albion and report; for expenses	29 50
	F. C. Curtis, M. D., for investigating diphtheria at Gouverneur; for traveling and hotel expenses.......................	19 61
26.	James T. Gardiner, C. E., for investigating the water and ice supply of Syracuse, 6 days at $15; for expenses.............	133 12
31.	Wm. Hailes, M. D., for biological examination of water, Gouverneur............	25 00

1886.		
Jan. 4.	Brace M. Gallien, for writing and assorting alphabetically index cards for birth registers, vols. xi, xii and xiii, 591 pages.....	$141 84
6.	Arthur Hollick, for services as inspector, Newton creek; for expenses...........	11 50
9.	Isabel L. Carman, for engrossing 40 pages marriage register, liber vi, at $1.25, to page 114 inclusive....................	50 00
	Maria Pratt, for arranging index cards of brides from liber i, ii and iii of marriage register, 600 pages at 12c. per page; for recording same in index book.......	168 00
15.	James T. Gardiner, C. E., for services 7¾ days at $15.........................	116 25
	Alfred L. Carroll, secretary, to reimburse him for payment to Hugh Weightman, for Epitome of English drainage laws for Fifth Annual Report..................	20 00
	Anna L. Mattimore, for writing and arranging by initial letter, cards for index from page 110 to page 200, vol. viii of death register, 91 pages at 12c; do. do. 200 pages death register, vol. ix; do. do. from page 1 to page 105 inclusive, of death register, vol. x.......................	47 52
29.	Brace M. Gallien, for engrossing in index cards for vols. xi, xii, xiii, birth registers, equals 591 pages.....................	94 56
Feb. 6.	Anna L. Mattimore, for writing index cards from page 106 to page 200 inclusive, of vol. x of deaths, 95 pages at 12c; for type-writing.......................	17 64
	Isabel L. Carman, for engrossing 25 pages marriage register, vol. vi, from page 125 to page 150, at $1.25.................	31 25
12.	James T. Gardiner, for 4½ days services as consulting engineer..................	67 50
Mar. 8.	Horace Andrews, for drafting maps of Rome and Binghamton...............	6 00
	James T. Gardiner, for services as consulting engineer, 19 days................	285 00
19.	Isabel L. Carman, for copying 51 pages marriage register, vol. vi, from page 150 to page 200, inclusive, at $1.25.....	63 75
	Anna L. Mattimore, for arranging alphabetically for index from page 1 to page 126, inclusive, of vol. viii, deaths; for writing same in index; for type-writing,	65 30

Apr.	6.	James T. Gardiner, for services as consulting engineer, 4 days; for expenses.....	$74 20
Mar.	9.	Horace Andrews, for tracings and blue prints...........................	3 25
Apr.	15.	Anna L. Mattimore, for arranging alphabetically for index 129 pages of deaths, to page 55, inclusive of vol. ix, at 12c. per page; for indexing the same at 16c. per page; for type-writing............	40 87
	30.	James T. Gardiner, for services as consulting engineer, investigating New York aqueduct, 13½ days, at $15; investigating Syracuse ice question, 1 day, at $15; for expenses...........................	268 41
May	3.	Horace Andrews, Jr., for services on Aqueduct Report........................	18 00
	15.	Anna L. Mattimore, for arranging for index 81 pages deaths, vol. ix, to page 136; for writing same in index at 16c.; for type-writing............................	35 63
June	19.	Anna L. Mattimore, for type-writing; for sorting for index 177 pages deaths, to vol. x, page 113, inclusive; for writing same in index at 16c.................	53 32
July	6.	O. S. Wilson, C. E., for services as sanitary engineer at Marathon; expenses.......	33 49
	17.	Anna L. Mattimore, for arranging for index 87 pages deaths, to page 200, vol. x; for writing same in index, at 16c.; for type-writing............................	35 55
	26.	James T. Gardiner, for services as consulting engineer, report on Piscawan Creek, 1 day; for report on Syracuse ice supply, 5 days; expenses.....	90 25
Aug.	9.	O. S. Wilson, C. E., for expenses to Corning to examine and report on plans of superintendent of public works to abate nuisance on canal	14 90
	27.	Anna L. Mattimore, for writing cards, 129 pages, vol. 14, births, page 1 to page 129, and sorting initial letter at 12c.; for do, page 1 to page 22, vol. 15, births, at 12c.; for type-writing	46 86
	27.	Emil Kuichling, for services and expenses examining saw-dust nuisance	71 19
Sept.	4.	Anna L. Mattimore, for writing cards for index, vol. 15, births, page 23 to page 200, inclusive, 178 pages, at 12c.; for type-writing.......	27 43

Sept. 6.	O. S. Wilson, C. E., for expenses while investigating slaughter-house nuisance at Penn Yan	$17	45
14.	James Law, State veterinarian, for services investigating lung plague at Gardiner, N. Y., 3 days; for expenses	83	02
16.	Fergus Halpen, for assistance in office, 2 weeks, at 50c. per day	7	00
28.	Hugh Weightman, for preparing synopsis on sanitary laws	50	00
	Total	$2,905	15

EXPRESSAGE AND TELEGRAPHY.

1885.			
Nov. 12.	American Express Company, October	$2	25
	Hudson River Telephone Co., October	5	30
	National Express Company, October	1	75
	Western Union Telegraph Co., October	15	29
Dec. 3.	American Express Company, November	2	05
7.	Western Union Telegraph Co., November,	3	10
	Hudson River Telephone Co., November	5	60
	National Express Company, November	1	00
1886.			
Jan. 11.	American Express Company, December	2	55
	National Express Company, December	1	60
19.	Hudson River Telephone Co., December	5	30
	Western Union Telegraph Co., December	2	26
Feb. 6.	American Express Company, January	1	00
	National Express Company, January	3	00
	Western Union Telegraph Co., January	9	24
	Hudson River Telephone Co., January	5	00
Mar. 8.	Hudson River Telephone Co., February	5	50
	Baltimore & Ohio Tel. Co., February		44
	Western Union Telegraph Co., February	1	30
	American Express Company, February	1	63
	National Express Company, February	7	40
April 1.	American Express Company, March	6	55
	Western Union Telegraph Co., March	4	36
6.	F. C. Curtis, to reimburse him for		75
10.	National Board of Health (Express Co.)	3	45
	Hudson River Telephone Company	5	35
May 8.	National Express Company, April	1	85
	Hudson River Telephone Company, April,	5	30
	Western Union Telegraph Company, April,	8	60
	American Express Company, April	3	10
June 3.	Western Union Telegraph Company, May,	1	72
	Hudson River Telephone Company, May	5	80

ne 14.	Baltimore & Ohio Telegraph Co., May....	$0 41
ly 7.	Hudson River Telephone Company, June..	5 10
	Western Union Telegraph Company, June,	3 72
31.	Baltimore & Ohio Telegraph Co., July....	25
	Western Union Telegraph Company, July,	1 25
ıg. 14.	Am. Hudson River Telephone Co., July...	5 50
pt. 2.	Hudson River Telephone Co., August.....	5 25
	Western Union Telegraph Co., August....	11 91
	Total....................................	$162 73

PRINTING AND STATIONERY.

1885.		
›v. 1.	Fergus Halpen..........................	$11 50
c. 16.	Fergus Halpen..........................	9 00
1886.		
ı. 2.	Van Benthuysen & Company............	246 25
9.	Fergus Halpen..........................	3 00
29.	E. H. Bender...........................	14 25
ır. 13.	Fergus Halpen..........................	5 00
›ril 1.	Fergus Halpen..........................	5 00
n. 9.	Weed, Parson & Company..............	243 16
ne 1.	Fergus Halpen, printing postals and envelopes..........................	13 75
ly 2.	Van Benthuysen Printing House.........	442 75
7.	Weed, Parson & Company..............	424 56
20.	Fergus Halpen, printing................	19 75
ıg. 9.	R. K. Quayle, engraving................	12 00
›t. 12.	Brockway & Sons et al., printing, etc., case of Westlake v. State Board of Health,	42 20
25.	Fergus Halpen, printing................	4 75
	Total....................................	$1,496 92

TRAVELING AND NECESSARY EXPENSES OF MEMBERS.

885.		
. 22.	Wm. M. Smith, for expenses attending meetings of board....................	$31 45
27.	Woolsey Johnson, for expenses attending meetings of board from July 16 to Oct. 21, 1885..............................	42 48
v. 28.	Frederick Carman, for expenses in attending meetings of the board in New York.....	18 30
	Alfred L. Carroll, for expenses in attending meeting of board in New York on sixteenth inst........................	15 49

Dec. 14.	Alfred L. Carroll, for expenses attending meeting of sanitary committee at Syracuse, N. Y	$18 27
	Frederick Carman, for expenses attending meeting of sanitary committee at Syracuse, N. Y........................	14 92
15.	Edward M. Moore, for expenses attending meeting of board........................	55 73
31.	Erastus Brooks, for expenses as member October 20th to December 20th........	59 52
1886.		
Jan. 22.	Edward M. Moore, for expenses attending meeting of board........................	23 6[illegible]
	Dr. Wm. M. Smith, for expenses attending meeting of board........................	15 6[illegible]
Feb. 12.	Dr. George W. Cooke, for expenses from November 10, 1885, to February 3, 1886	54 [illegible]
Mar. 8.	Dr. F. C. Curtis, for expenses attending meeting of board........................	23 [illegible]
13.	Woolsey Johnson, for expenses from January 13, to March 3, 1886.............	39 [illegible]
	George W. Cooke, for expenses from February 24 to March 3, 1886............	23 [illegible]
	Frederick Carman, for expenses attending meeting of board........................	14 [illegible]
	Alfred Mercer, for expenses from September 23, 1885, to March 3, 1886........	78 [illegible]
Mar. 16.	Edward M. Moore, for expenses as member	27 [illegible]
April 8.	Lewis Balch, for expenses attending duties of board........................	23 5[illegible]
10.	Erastus Brooks, for expenses attending meetings of board	61 3[illegible]
14.	Lewis Balch, for expenses attending duties of board	6 5[illegible]
15.	Frederic Carman, for expenses while organizing boards of health................	13 25
May 12.	Frederick Carman, for expenses while examining nuisance at Saratoga Springs	3 40
29.	Lewis Balch, for expenses attending duties of board	14 20
June 11.	Frederick Carman, for expenses to Saratoga and return	2 20
11.	Lewis Balch, for expenses on official duty to Phœnicia........................	9 88
23.	Dr. Wm. E. Milbank, for expenses to attend New Yorkmeeting, March third........	10 50
26.	Erastus Brooks, for expenses from April first to date, attending meetings, etc.........	52 60

ne 29.	Frederick Carman, for expenses to Rochester and return, organizing local boards	$10 51
ly 2.	George W. Cooke, M. D., for expenses attending meetings of board...........	13 22
14.	Wm. M. Smith, M. D., for expenses attending meeting	11 85
28.	Frederick Carman, for expenses to Troy, Amsterdam and Saratoga	3 81
g. 23.	Lewis Balch, for expenses investigating Brighton nuisance....................	26 16
23.	Frederick Carman, for expenses investigating Brighton nuisance	12 16
28.	Lewis Balch, secretary, for expenses examining old canal nuisance at Rome	5 15
t. 2.	Dr. Edward M. Moore, for expenses attending meeting June 23 and August 31, 1886,	33 82
2.	Dr. Wm. M. Smith, for expenses attending meeting of board	12 10
		$883 34

SALARIES AND WAGES.

385.		
. 31.	Salaries for October..	$1,029 15
. 30.	Salaries for November............... ...	1,029 15
. 31.	Salaries for December...................	1,029 20
386.		
. 31.	Salaries for January...	1,029 15
. 28.	Salaries for February....................	737 49
. 31.	Salaries for March.......................	737 52
r. 1.	Fergus Halpen, increase for March...	8 33
6.	F. C. Curtis, extra compensation..........	200 00
30.	Salaries for April..................	1,037 49
y 31.	Salaries for May.........................	1,037 49
e 30.	Salaries for June........................	1,037 52
y 31.	Salaries for July.........................	1,037 49
g. 31.	Salaries for August......................	1,037 49
. 30.	Salaries for September...................	1,050 02
		$12,037 49

PETTY CASH.

386.		
. 15.	S. G. Speir, type-writer supplies..........	$10 39
. 6.	S. G. Speir, type-writer supplies..........	1 00
	John Ferris, shoe brushes............ ..	1 25
r. 1.	S. G. Speir, type-writer supplies..........	1 00
	D. V. O'Leary, postmaster	3 00

Apr. 10.	Hammond Type-writer Company, ribbons.	$1 00
June 3.	Peter Halpen, for assistance in office......	1 00
14.	Stewart G. Spier, type-writer supplies.....	5 60
Aug. 9.	S. G. Speir, type-writer supplies..........	7 40
		$31 64

FURNITURE.

1886.		
Apr. 5.	F. F. Romeyn, 6 boxes..................	$7 20

LIBRARY, MAPS AND CHARTS.

1886.		
Jan. 15.	Wm. Wood & Co., subscription to Medical Record............................	$5 00
27.	The Sanitarian subscription to Dec. 1886...	4 00
Mar. 19.	B. Westermann & Co., subscription to Analyst 1886; 3 Hagers Untersuch.....	4 14
Apr. 24.	Journal of Comparative Medicine and Surgery, subscription for 1886.............	2 00
May 10.	The Sanitary Engineer, subscription, to March 30, 1887..................	4·00
June 14.	Sampson, Murdock & Co., Albany Directory,	3 00
Aug. 9.	R. L. Polk & Co., Medical and Surgical Directory...........................	5 00
		$27 14

SUMMARY.

Special expert and temporary service....	$2,905 15
Expressage and telegraphy......................	162 73
Printing and stationery..........	1,496 92
Traveling and necessary expenses of members.......	883 34
Salaries and wages..............................	12,037 49
Petty cash....................................	31 64
Furniture.....................................	7 10
Library, maps and charts......................	27 14
	$17,551 61

REPORT

OF THE

Sanitary Committee.

REPORT OF THE SANITARY COMMITTEE.

ɔ this department of the Board's work, during the past year, effort has been made to distinguish between nuisances that were enace to the public health and those that were simply annoy- ɔs or private grievances for which ample redress was already vided in the courts.

Many complaints upon investigation proved to have been ggerated, and in some cases to have originated in malice, or a ire to secure personal aggrandizement. All such were properly ɔouraged. Others were of trival nature and were settled by respondence. On the other hand there were questions of ger scope, requiring for their settlement expert investigation. e particulars of these larger inquiries are hereto appended.

At Philadelphia a careful examination was made as to the ect of discharging sawdust wastes into the Indian river, a con- t having arisen between the local board of health and the mill ıers on the subject. The report of Mr. Kuichling states both s clearly, and besides bringing together the latest scientific earches on the sawdust question, points out various methods of fitably utilizing the wastes, without occasioning annoyance or sance to anybody.

At Penn Yan a slaughter house nuisance was complained of. ıad been established at a time when its immediate vicinity was sparsely settled, when it occasioned little nuisance. With the wth of the village, however, its offensiveness increased, and lic sentiment required its removal. The village ordinances ade such establishments being located in the corporation, but arently they had not been enforced. Mr. Wilson's report ibits the present status of the case and the probablity of an y removal to a more isolated site. Slaughter-houses have been plained of in various other localities. Slaughtering seems to business, which, when conducted in the usual old fashioned , without modern scientific improvements, must be more or of a nuisance, and must be conducted in places remote from ulous centers. It seems, however, hard to convince those aged in the business, that having enjoyed undisturbed possession place for a number of years, they must at last yield to a public essity, pull up stakes, and go elsewhere.

At Kingston, the potable public water supply was being defiled, rtly by sewage contamination on the water shed, and partly by perfect methods of filtration. The State Board was asked to

prescribe rules and regulations for preserving its purity. The report of Mr. Gardiner has shown the rather singular occurrence of a water company by imperfect methods of filteration defiling the water it was endeavoring to cleanse.

At Norwich, the water supply was being defiled by washings from barnyards located on the slope of the reservoir which were brought into it with every rain storm. Mr. Gardiner's report shows a simple remedy for this trouble by judicious trenching, thus intercepting and carrying off the defiling matter before it reaches the reservoir.

At Port Jervis a fine supply of excellent water was being defiled by pig-sties and privies located on lands furnishing tributaries to the reservoirs. The owner was unwilling to abate the nuisance in the hope of forcing the water company to purchase his land at a high rate. As Mr. Kuichling's report shows the whole trouble could be remedied at a small outlay.

At Phœnicia a similar case of willful contamination of water by the droppings of cattle, privy defilement, etc., was complained of. The local board appealed to this office, and was advised to take summary measures to prevent the unnecessary pollution of the water.

The most singular question in relation to water supplies investigated by the board was at Mount Vernon, where the health officers of both the town of East Chester and village of Mount Vernon, were opposed in view regarding the purity of the water, and where equally positive opinions for and against the water were given by chemists of undoubted standing. The report of Mr. James T. Gardiner, on his examination of the water shed, throws grave doubts upon its purity or sufficiency.

At Canisteo and Camden interesting sanitary examinations were made, and alarming prevalence of zymotic disease discovered.

By direction of the Senate an examination was made of the sanitary condition of the New York aqueduct, and printed report made to the last Legislature, but as it is part of this year's work it is here given.

Auburn applied for sanitary engineering advice in regard to locating its high school, and Prof. Prescott was sent to confer with the boards of health and education on the subject.

During the past year the examination of the ice supply of Syracuse has been completed and a report thereon will be found appended. It disposes of the popular fallacies: First, that water in freezing purifies itself; and, second, that ice cut from impure water is no purer than the water itself. The truth, as usual, lies between these extremes. It still remains true, however, that impure water affords a dangerous ice supply.

The examination of the water supplies of Syracuse is not yet completed; but the investigation of the Jamestown water supply is finished, and the results reported.

REPORT ON SAWDUST NUISANCE AT PHILADELPHIA, JEFFERSON COUNTY.

ROCHESTER, N. Y., *August* 14, 1886.

LEWIS BALCH, Esq., M. D., *Secretary of State Board of Health Albany, N. Y.:*

DEAR SIR.— Permit me to transmit to you herewith a report of the sanitary inspection made by me at Philadelphia, Jefferson County, N. Y., on July twentieth and twenty-first, by request of your Board, and with particular reference to the pollution of the Indian river at that place with sawdust and other saw-mill wastes. The inspection was made in company with Dr. Geo. D. Hewitt, of Carthage, and Dr. Dewitt C. Rodenhurst, health officer of Philadelphia, and also a number of residents and members of the health board of Philadelphia. After the several localities complained of along the river had been carefully examined, a public conference between the local board of health and the owners of the saw-mills was held, at which the latter were represented by Dr. Geo. D. Hewitt, of Carthage, and Dr. H. G. P. Spencer, of Watertown. These two physicians seemed to entertain the opinion that no *present* nuisance existed in the Indian river at the locality named, but as they both desired some time for consideration of the subject before reaching a definite conclusion, and as I have not heard from them since, I can only convey to you my own opinions as derived from a careful examination of the river and its banks for a distance of more than one mile in length on each side of the village, also as derived from exhaustive questioning of a number of residents who appeared at the conference.

REPORT.

The village of Philadelphia is located on the Indian river in the north-eastern portion of Jefferson county, and has a population of about 800. Its principal industries are as follows: Two large saw-mills, one planing-mill, a tannery, a flouring-mill, and a large cheese-box factory, in all of which a considerable number of resident operatives obtain constant employment. The cheese-box factory is about one and one-fourth miles west of the village, while the remainder of the establishments named are situated directly in the village proper. The Indian river flows in a general westerly direction through the town, and although its current is relatively slight on each side, yet in the village itself it passes through a rocky gorge where, in a distance of about one-fourth of a mile, it falls about sixty feet, thus affording an excellent opportunity for the development of water power. All of the aforesaid manufacturing establishments are located upon the banks of the river, and throw more or less of their waste products therein. On each side of the gorge

in the village, the natural descent or slope of the river is quite small, so that a mill-dam of ten or twelve feet in height causes the water to set back for a long distance, forming narrow and much elongated ponds. In the summer season the discharge of the stream is comparatively slight, and it then resembles a large creek rather than a river. The water is very dark brown, indicative of peat or swamp discoloration. Where the current is appreciable, the bed of the river is found to be clean granite rock, but where it has been checked by the erection of dams, or by the presence of natural barriers, extensive deposits of mud and alluvium may be seen on the bottom and margins. Easterly towards the village of Antwerp, about seven miles from Philadelphia, the country is quite flat, while towards the west it is rather hilly. The surface soil is generally a strong clay, overlying a very irregular granite and gneiss formation, which in many places projects considerably above the ground. In consequence of these topographical and geological peculiarities, many swampy basins occur in the locality, as is clearly and unmistakably revealed by the character of the vegetation in the fields and pastures. An extensive marshy area of several hundred acres, covered with forest trees and brush, is found adjacent to the river immediately east of the village, and similar smaller areas exist in the alluvial bottom-lands on the west.

Throughout the entire region drained by the Indian river, vast quantities of pine, hemlock and spruce lumber are produced every year. Saw mills have been in active operation on the stream for many years past at Antwerp, Theresa and several other points, both above and below Philadelphia; and at all of these places the practice has been to dispose of the sawdust and mill-wastes by throwing the same into the river. Freshets carry off much of this waste matter into the St. Lawrence; but considerable deposit lodge in the pools and marginal irregularities of the stream, and defy the scouring action of ordinary floods. The manner in which these large masses of sawdust are formed and become fixed in rivers, with irregular and rocky beds and shores, I have already described in a former report to your Board relating to the sawdust nuisance at Fort Edward, N. Y., and need, therefore, not be detailed here. Suffice it only to say that when sawdust becomes saturated with water in a turbid stream, its specific gravity increases and it will settle at all points where the current is sufficiently checked. In this manner sawdust accumulations of some extent have been formed in the mill-ponds and slack-water of the Indian river, above and below the village of Philadelphia, partly from the mill-wastes produced in that place, and partly from that produced at Antwerp and other localities farther up the stream. To assert that the existing deposits under consideration are due entirely to the saw-mills at Philadelphia, would be manifestly incorrect, since the largest of the exposed accumulations, covering an area of only about one-fifth of an acre, and having a maximum depth of from twelve to fourteen

feet, is found at a point on the river about half first mill in that village. Other deposits exist in which are sometimes exposed in periods of low-w[ater] favorable places along the banks of the river bel[ow] small accumulations may be found.

The saw-mills, planing-mill and cheese-box factory at have been operated energetically only during the pas[t] and produce annually about seven million feet B. M. o[f] lock and spruce lumber, and several thousand boxes r[e] For the latter, elm logs and thin bass-wood heading n[...] used. But little sawing is done at the box factory, as th[e] are cut up by a system of shaving, which produces no fi[...] while the heads of the boxes are cut into a circular sha[pe] thin boards prepared elsewhere. The principal refuse of th[e] lishment is the bark, "butts" and large cylindrical heart-c[...] the elm logs, and the edgings from the bass-wood heads. shaving the logs, they are well steamed, and before makin[g] thin sheets of wood into boxes, another steaming process is [...] sary, so that considerable heat is required for the operation. of this steam is obtained by burning as much of the refuse as [...] sible, but a large surplus remains on hand, the bulk of which, c[on]sisting of the bass-wood edgings, is thrown into the river. Of t[he] saw-mills in the village, one is operated entirely by steam powe[r] for the production of which, slabs and edgings only are burned while all other wastes are thrown into the stream. The other saw-mill and the planing-mill are worked with water-power alone, so that no part of their refuse products are utilized for the generation of steam.

It will thus be seen that from the manufacture of so much lumber as already mentioned, a large amount of sawdust and refuse woody matter necessarily finds its way into the river. When logs are cut into *common boards*, it is usual to estimate that one fifth of the volume of each log is converted into sawdust; but when a portion of the product is plank and timber, the volume of resulting sawdust is proportionately less. Taking this ratio at one-sixth of the bulk of the merchantable lumber actually manufactured every year at Philadelphia alone, and remembering that such bulk is 7,000,000 feet, B. M., or 583,333 cubic feet, we shall obtain an annual volume of 97,222 cubic feet, or 760 cords of solid wood in the form of sawdust, the whole of which is disposed of by throwing it into the small river at an average rate of more than two and one-half solid cords per day. It must be borne in mind that this volume refers only to the *sawdust*, and that in estimating the actual pollution of the stream, a considerable addition should be made for such other mill-wastes, in the form of bark, slabs, lath, shavings and edgings, as are not consumed for fuel.

Having thus briefly described the wood-working and lumber interests of Philadelphia, together with its topographical surr[oundings]

ings and the deposits of sawdust in the river for a distance of about one and one-half miles each way from the village, let us now turn to the sanitary aspect of the problem presented. It appears that the local board of health is of the opinion that the deposits of saw-mill wastes in the Indian river, in the township of Philadelphia, are nuisances dangerous to the public health, and that the practice of the mill-owners of disposing of their refuse woody matter by throwing the same into the stream, should be stopped at once. Now while these propositions may be true in general, yet the fact is that the health officer cannot prove their truth by appealing to the records of the prevalent sickness in the locality, since both he and all of the other medical practitioners in the whole district are compelled to admit that cases of paroxysmal, enteric, remittent and malarial fevers are of extremely rare occurrence in the entire township, and that no disagreeable or noxious effluvia have been heretofore noticed as coming from such deposits. The mill-owners, accordingly, deny the truth of the above-named propositions of the local board of health, and insist that any restrictions as to their mode of disposing of their mill-wastes, which the public health authorities may impose upon them, are unwarrantable in the premises. A conflict between the parties has thus arisen, and the State Board of Health is asked to interfere and to uphold the local authorities in their views and decisions.

From my own examinations of the saw deposits on the two days of my visit, I was unable to detect any *offensive* odor arising therefrom, or to discover any resident of the village who had noticed any such odors. The only odor discernible from fresh deposits was the peculiar pungent smell which invariably attends the manufacture of lumber from resinous wood, and this ordor is not generally regarded as noxious or offensive; the older deposits, on the other hand, whether on the surface or at a distance of several feet below the surface, gave off only a faint odor of humus or peat, less marked even than the smell of the adjacent mud or soil. The atmosphere of the locality generally, did not appear to be tainted or offensive, and the physicians all agreed in the opinion that it was salubrious. In view of these facts and statements, I must admit that *at the time of my inspection*, no nuisance dangerous to the public health was found in the form of the sawdust deposits in the Indian river, of which complaint has been made, also, that if malarial fevers had *then* been of frequent occurrence in the village and its immediate vicinity, a number of other causes therefor could properly be assigned, such as the proximity of considerable areas of of undrained land, improper domiciliary conditions, lack of subsoil drainage, impure water, etc.

It is, however, only fair to state that the conditions which obtained at the time of my inspection may have been exceptionally favorable, and that no guarantee for the *continuance or permanence* of such conditions can be given, either by the mill-owners, or by

any one else, in cases like the one under consideration. Sanitarians generally admit that the vicinity of large quantities of decomposing wood is dangerous to health, not so much in consequence of the emanations from the rotting vegetable matter itself, but in view of the well-established fact that the specific causes of a number of dangerous fevers seem to flourish and increase when they find lodgment where such decaying wood is present in masses of considerable magnitude. Instances of the prevalence of fever epidemics, coupled with the existence of decomposing timber, chips, shavings and sawdust, have been so often noted in many different localities that the theory of simple coincidence can no longer be safely maintained, even though the exact relation between cause and effect has not yet been clearly demonstrated. We do know, however, that all varieties of wood contain gum, sugar, resin and albuminoid matter in more or less quantity; that logs contain a larger amount of such substances, even after a long immersion in flowing water, than the boards which are cut therefrom, and subsequently undergo an additional seasoning process; that common seasoned lumber always contains a considerable quantity of soluble nitrogenous or albuminous matter; and hence, that the sawdust and mill-wastes from the comparatively green logs must contain a much greater amount of such matter than sawdust and shavings from thoroughly seasoned lumber. It is further known that cellulose, or pure woody fibre, which in an isolated condition undergoes a change very slowly, is, nevertheless subject to a remarkably rapid decomposition by a ferment contained in all fertile soils, whereby it is converted into carbonic acid and marsh gas; also, that when moist wood is exposed to the air alone, a kind of fermentation of its nitrogenous constituents takes place, in consequence of which oxygen is absorbed, carbonic acid and water are evolved, and the woody fibre crumbles into a blackish brown vegetable mould called *humus*, *ulmin*, or *gein*. As an additional fact, it is known that the gums, sugar, and a part of the resinous extractive and albuminoid matter in all woods are soluble to a considerable extent in water at common temperatures, and that water containing these substances in solution will favor the development and reproduction of many varieties of bacteria and other low forms of life; also, that certain of these micro-organisms which *can* be propagated in such water are recognized as the specific cause of certain diseases. The conclusion to be drawn from these premises obviously points to the proposition that large deposits of decomposing vegetable matter, such as sawdust, must be regarded as dangerous to the public health, and that a continuance of the practice of depositing such matter in public waters, where it can accumulate in extensive bars or shoals, should be prohibited by law.

It has been asserted that the reason why the sawdust deposits in the Indian river at Philadelphia, are not offensive or dangerous to human health, is because almost the whole of lumber produced

there is manufactured from highly resinous wood, such as spruce, hemlock and pine, and that the resin both prevents the decay of the woody fibre and arrests the decomposition of the sap and other soluble albuminoid matter. Doubtless there is some truth in this assertion, but to what extent the resinous and aromatic extractive matters in such woods tend to retard or prevent fermentation and decay is not definitely known. The experiments and researches of Prof. Wm. H. Brewer, of New Haven, Conn., and of Dr. J. H. Kellogg, of Battle Creek, Mich., made several years ago, together with those more recently conducted by Dr. R. C. Kedzie, ex-president of the Michigan State Board of Health, all agree in the conclusion that resinous woods, whether green or partly seasoned, contain a considerable amount of soluble nitrogenous matter capable of active fermentation or decomposition, and of emitting intensely offensive odors. After describing several experiments made with water in which sawdust, mainly from pine wood, had been saturated, Dr. Kedzie says: "It is commonly considered that colophony and resinous materials of every kind in pine wood are not only insoluble in water, but that they exert a strong preservative influence upon such wood, preventing decay and securing immunity from organic contamination of soil waters. But solubility and insolubility are relative terms; all substances of very sparing solubility are called insoluble. Very few substance can be called absolutely insoluble. While resin, as such, is insoluble in water, its combinations with the alkalies are readily soluble in water, and even the salts it forms with lime, magnesia and oxide of iron, have a sensible solubility. Stover in his dictionary of chemical solubilities, says of all these salts that they are sparingly soluble in water. The lime salt is soluble in three thousand parts of water. But, whatever may be the facts in regard to the insolubility of these resinous principles in pure water in their separate form, it is evident that a certain degree of solubility attaches to them in their original combination in woody fibre when treated with water containing a small amount of alkaline carbonates, or even alkaline earths. * * * Such water has a marked solvent action on certain principles in pine sawdust. The organic matter in this sawdust water is not merely suspended matter which will settle after a time and leave the water clear, but is dissolved in the water. * * * After standing for a few days in a closed vessel, the water, which was of a brownish hue, acquired a very offensive odor, and this odor was present in all the natural sawdust waters I examined. * * * During evaporation of all these waters a piney odor escaped. * * * The residue left was a dark, tarry mass, which gave off a dark smoke during ignition, the odor of resin, and, at last, a choking smell of charring pine wood. * * * The water also held a sensible quantity of nitrates and traces of nitrites in solution. * * * I close this discussion with five general conclusions.

"1. These sawdust waters all contain an amount of organic matter sufficient to condemn them for potable and culinary use.

"2. They all contain resinous extractive matter in solution.

"3. They all contain nitrogenous material capable of yielding albuminoid ammonia greatly in excess of the sanitary limit.

"4. They contain all the chemical elements necessary to sustain low forms of plant life.

"5. In the presence of so large an amount of organic matter and the chemicals of plant life, these waters may become dangerous by nourishing and reproducing the germs of epidemic disease, should they find lodgment therein." In like manner, Dr. Kellogg, after having collected all available facts bearing upon the relation of decaying wood to disease, with special reference to the numerous pine sawdust nuisances in the State of Michigan, believes "that it can be shown beyond room for reasonable doubt that the following propositions are true: First, that wood, whether as sawdust or in some other form, when under favorable conditions of warmth and moisture and exposed to the air, undergoes a form of decomposition which is accompanied by the evolution of gases of an unpleasant and presumably unwholesome character; and, second, that the decomposition of wood is also accompanied by the development of bacteria and other low forms of life, which are associated with the decomposition of nitrogenous substances, and which are in the light of modern investigations regarded as intimately connected with the development of many serious diseases." Prof. Brewer also states, in a valuable paper read before the American Public Health Association in 1879, that "when green wood is well soaked in cold water a considerable quantity of albuminoid matter is dissolved out. This solution is extremely putrescible, and the fact is true of all kinds of wood. * * * The odor is very rank and varies with the kind of wood, also with the temperature, the degree of concentration of the solution, and probably also with the amount of tannin and other similar extractive matters contained in the wood. * * * In light, the liquor becomes dark in color and sour. In the dark, the odor seems more offensive than if the decay goes on in the light. * * * Heart-wood and sap-wood act essentially alike in this matter; the difference is one of degree rather than of character. * * * If piles about our wharves and similar structures do not smell so bad, it is merely because the solution is more dilute. The decay goes on, however, and so with vegetable matter decaying in swamps, sawdust in ponds, and so on to the end of a long chapter. The exhalations of swamps, or of vegetable matter decaying in still water, is universally regarded as unwholesome, in climates where, for a part of the year at least, the weather is as warm as we have it. So far as I know there is no exception to this on the whole earth, and hence the general sanitary bearing of the observations here recorded need not be further argued." It is

believed that the foregoing quotations will be sufficient to show that the assertions with regard to the harmlessness of deposits of sawdust derived from resinous woods are not yet accepted by competent authorities, and hence that such accumulations must still be regarded as highly suspicious, to say the least.

The question now arises as to the disposal of the mill wastes in some other practicable way than by throwing them into the stream. Many solutions of this important problem have been presented, but their successful application to a particular case is extremely difficult and depends largely upon the enterprise and available capital of the mill-owners. The simplest method of disposal is to utilize these wastes for fuel in generating steam power on the premises where they are produced. Its value for this purpose has long been recognized, and cases of its adaptation are very numerous throughout nearly all lumbering districts. Experts in steam engineering usually estimate that three cords of soft wood sawdust are equal in evaporative effects to one ton of anthracite coal; and that the combustion of one ton of such coal under a properly designed steam boiler will, during a working day of ten hours, generate sufficient steam to operate a forty-horse-power engine for the same period of time. Now since, on the average, two and one-half solid cords of sawdust alone are produced each working day at the two saw-mills at Philadelphia, it follows that from this waste material at least thirty-three and one-third horse-power could be developed daily by its consumption as fuel under a steam boiler. There are no practical difficulties in the way of this mode of disposing of the refuse sawdust, shavings, bark, slabs and edging, all that is required is a specially designed furnace, the engine, boiler and buildings, and a moderate degree of enterprise on the part of the manufacturers. In addition to its utilization for producing steam power, sawdust has also been successfully employed in the manufacture of wood-pulp for paper-making; of heating and illuminating gas; of charcoal for gunpowder, filters, etc.; of artificial fuel in the form of compressed blocks; of a light and useful building material known as "terra cotta lumber;" of deafening and packing material for manifold uses; of certain acids used by dyers and chemists; and, finally, in the production of a manure or compost particularly adapted to heavy soils. As it may be of interest to many persons to learn some of the details of these different operations to which the sawdust is subjected, the following brief statements are appended:

For converting sawdust and shavings into *cellulose*, or *wood-pulp*, two or three processes are now in use, one method being to treat the material with caustic soda, while another employs acids to effect disintegration. All systems of treatment, however, involve the use of heat and high pressures. A few years ago, a machine was constructed at Troy, N. Y., to reduce saw-mill refuse into pulp suitable for paper making. It was operated with a fifteen horse-

power engine, and converted a charge of 1,600 pounds of sawdust into 1,200 pounds of pulp in a period of three hours. The pulp thus produced may be used for the manufacture of nearly all kinds of paper, and is said to be equal in quality to that made from rags, jute and similar substances.

The making of *heating and illuminating gas* from sawdust is a new branch of trade which is important in all places where coal is expensive and saw-dust is thrown away. A description of one process of manufacturing such gas from sawdust is contained in the "Journal of Gaslighting" for 1884, and from this we learn that a charge of 2,000 pounds of dry pine sawdust, carbonized at a temperature of 1,500 degrees F., yields from 11,000 to 14,000 cubic feet of gas having an illuminating power of fifteen candles and a specific gravity of from 0.59 to 0.62. More resinuous woods give gas of a higher candle power. The heating value of such gas is fully equal to that of the best coal gas, and it remains fixed or permanent at nearly all temperatures. The cost of producing sawdust gas, without allowing for the value of the residual products, is shown to be about thirty-five cents per 1,000 cubic feet; but if said value is properly credited, then the cost of production becomes reduced to about one and two-third cents per 1,000 cubic feet. In 1883, works for the manufacture of such gas were erected and put into operation for the town of Deseronta in Canada, and the gas thus produced is said to be equal to that made from the best cannel coal.

For making *granulated charcoal* from sawdust, the latter is carbonized in iron retorts, yielding twenty per cent of charcoal, which can be used for gunpowder, fireworks, filters, refrigerators, disinfectants, etc., twenty-two per cent of fixed gases suitable for heating or lighting purposes; forty-seven per cent of pyroligneous acid or crude acetic acid; ten per cent of wood tar, and one per cent of wood alcohol. Resinous woods yield a special line of products, all of which have a commercial value in different trades or industries. Another process is to carbonize the sawdust in special kilns, instead of in open heaps. The charcoal thus produced does well, when mixed with ordinary wood charcoal, for forge fires, but it is not so well adapted for blast furnaces. In comparison with the charcoal made by carbonizing sawdust in open heats, the material produced in kilns has the advantage of a lower cost, of better yield, of being clean and free from dust, and of more easily conducted carbonization, as the process is not affected by the weather. These modes of utilizing mill-wastes are practiced to a large extent in Sweden and other European countries.

In the manufacture of *artificial fuel*, sawdust is compressed into cakes or blocks of varying sizes, after being mixed with resin, pitch, or other inflammable waste products. Successful experiments have also been made by mixing it with coal dust, culm, and similar organic refuse, and then compressing it with powerful machinery

into lumps or blocks of convenient size for burning in the furnaces of steam-boilers. The first named line of products are common articles of commerce for lighting fires of all kinds.

The peculiar and useful product called "*terra cotta lumber*" affords another illustration of how sawdust may be utilized advantageously. It is made by mixing a particular kind of clay with sawdust, and then burning properly shaped blocks of the compound in a kiln. In this process the woody matter is completely burned out, leaving a spongy or porous mass of terra cotta which may be manipulated in many respects like common lumber, whence the product derives its name. Being fire-proof and very light, it may be adapted to a great variety of uses in architectural work. The clay which is employed in its manufacture has also heretofore been a refuse material, not available either for common brick or fire brick, and is exceedingly abundant in many localities. There seems to be no reason, therefore, why terra cotta lumber cannot be produced so cheaply as to bring it into general use, and thus form the basis for a large and profitable industry.

Sawdust is also used extensively, without any previous treatment, for numerous purposes, such as packing and storing ice, deafening floors and walls, protecting water pipes from frost in exposed situations, packing goods for transportation, filling a variety of toys, strewing floors and icy walks in winter, bedding for animals, etc. It has also been used with good results as a substitute for sand in common and hydraulic mortars, where lightness of the mass was desirable. The fact that it is in growing demand for miscellaneous familiar purposes can be established by the circumstances that in the city of New York alone a business of more than $2,000,000 annually is done in sawdust; that forty years ago, the owners of saw-mills were glad to have it carted away without expense; that twenty-five years ago, it could be bought for fifty cents per load; and that now, it brings three dollars and a half per load at the mills, where not too remote.

Another interesting attempt to abate the nuisance occasioned by sawdust deposits in rivers, was the effort made several years since, on the part of a chemical manufacturing company to utilize the sawdust accumulations in the Mississippi river, at and below Minneapolis, for the production of certain expensive acids largely used by dyers and in other industrial operations. It is a source of regret that the result of this venture could not be definitely ascertained.

Finally, in its applications to agriculture, the sawdust has found numerous staunch adherents. The manner in which it is utilized varies with the character of the soil and the plants. One of the commonest processes is to form the sawdust into a compost with green vegetable matter and other offal, and then use it as a fertilizer or manure.

Having thus briefly indicated some of the various uses to which sawdust has been and still continues to be successfully put in our own country, it might now be asked which one of the several methods of utilization should be recommended to the saw-mill owners of the village of Philadelphia. This question should properly be answered by these owners themselves, after a careful consideration of the problems involved, since it is sufficient for the health authorities to point out the fact that the sawdust which now pollutes the waters of the Indian river, and which may in the near future cause much distress and suffering in the village, *can* be disposed of in some other manner than the present one *without financial loss* at all events, and possibly even with material profit. A satisfactory demonstration of this fact is of the utmost importance in all such cases of nuisance caused by rotting sawdust deposits, because science is in general only able to prove that under particular conditions of warmth and moisture, the emanations from masses of decomposing vegetable matter often contains the specific poisons which produce some or all of the zymotic and malarial fevers, and hence that such masses in the vicinity of human habitation must be regarded as probably dangerous to health. Common prudence, therefore, requires sanitary authorities to consider accumulations of this kind with profound suspicion, even while the same appear to be harmless; and as soon as these facts are intelligently presented to the saw-mill owners, it will become difficult, if not impossible, for them to escape a serious responsibility in the event of an extensive outbreak of one of the diseases named. General consideration for the public health should accordingly dictate to the mill proprietors a speedy and effective change in their method of disposing of their waste products, since in almost every instance the display of a decent amount of enterprise and business capacity on their part will be sure to discover some inexpensive means of utilizing such wates, or of preventing them from becoming a nuisance detrimental to health.

Respectfully submitted,

EMIL KUICHLING,
Civil Engineer.

The report of Mr. Kuichling was approved, and a copy sent to the board of health of Philadelphia.

LEWIS BALCH,
Secretary S. B. H.

COUNTER REPORT.

No. 17 STONE STREET,
WATERTOWN, N. Y., *August* 20, 1886.

To the State Board of Health:

I have the honor to present herewith the result of my investigations (2) in reference to the sanitary condition of the town of Philadelphia, N. Y. I would say that perhaps as you know Philadelphia is situated in the northern portion of Jefferson county at the junction of Indian river and Black creek. I find in the village two saw-mills which are running and cutting, upon an average, about 50,000 feet of lumber per day, most of which is cut into timber, and the sawdust of said mills is carried into the river and most of it is carried along down the stream, as there is an abrupt fall of from thirty (30) to fifty (50) feet a short distance from the lower mill. There is but little of the sawdust remaining and that is carried away by the high water during the spring and fall, sweeping everything clean from the rock bound and rock bottom stream. I would further report that the timber sawed is of the *resenoid kind*, and in the immediate vicinity of the mills the air is more or less filled with the agreeable and pleasant aroma of said woods, viz.: Spruce, pine, hemlock and cedar. The refuse of one mill is sawed into stove wood and that of the other is burned in a place prepared for that purpose as rapidly as produced. I have had interviews with the three physicians of said town, one of whom has been there in active practice some ten or fifteen years, and they all agree in saying that no case of malarial fever has occurred in the vicinity of the streams during their practice in said town. Not a sporadic case of any kind. I would also state that I have been in practice in the county over forty years, and have often been called there in consultation and have no remembrance of any epidemic of any kind and especially of any low form of fever or of diphtheria during said time. In fact, I think the town has averaged, if not *the most healthy*, one of the most healthy in the county. I would also state that the resenoid sawdust, by reason of its being frequently (*i. e.*, spring and fall) removed, no decay or even fermentation can take place, and by reason of its antiseptic and absorbent properties would act to prevent the unhealthy or sickening effects of the decayed or decaying vegetation of the albuminoid growths, or of any other unhealthy gases.

Respectfully submitted,

H. GORDON T. SPENCER, M. D.

REPORT ON THE SLAUGHTER-HOUSES OF PENN YAN.

Dr. LEWIS BALCH, *Secretary of the State Board of Health:*

SIR.—I visited Penn Yan on the third instant and submit the following report with regard the slaughter-houses complained of. I have prefixed some general remarks regarding the sanitary condition of the village that seem to be necessary for a full understanding of the situation.

Penn Yan is the county seat of Yates county and is the largest village in it. It has a population of about 5,000. It is a growing, live place, situated at the foot of the beautiful lake Keuka. It has extended its corporate limits several times; the inclosed sketch shows its present bounds. It is expected soon to be extended to the south-east.

WATER SUPPLY AND SEWAGE DISPOSAL.

Although during the past few years the question of putting in water-works has been agitated nothing definite has been done, and except for fire purposes the people rely upon wells which vary in depth from fourteen to forty feet.

The soil varies in different parts of the village, but in the more thickly settled portion is gravel and loam. It is in this section that water is found at a depth of twelve to twenty feet.

There is no sewerage to speak of. During the past year a short sewer was put in along the lower end of Main street and along Main street. In some of the better class of residences private drains conduct the sewage to the creek running southerly through the village. The large majority of the people use privies which receive little or no attention and when filled a new vault is dug and the privy placed thereon while the old one is covered with earth. A few of the people using privies are careful to keep them in fair condition and have them pumped out occasionally and the contents removed; these are rare exceptions. I call attention to this more on account of the danger to be apprehended from the pollution of the well water than from an æsthetic point of view. There are several complaints of privy vaults in different parts of the village and I saw several that were a blot on our boasted civilization. It is very desirable that a thorough inspection of all privies in the village should be made by a competent person at least once a year—say in May—and those needing attention reported to the local health board to be ordered cleaned by them if necessary. The necessity of this is recognized by the local health board, but they claim they have no money to pay for such inspection.

The system of vaults for privies should be abolished and until the village can afford a system of water supply and sewerage, water tight drawers or tubs should be used under the privies which should be emptied as often as necessary and kept disinfected.

The well at the academy is near one and between two large privy vaults which are quite deep, being only a few feet above the ground water. The protection of the health of children in public schools is of the utmost importance and the school trustees and board of health should awake to their duty in this matter. One of the ward or district schools, at which about 100 small children attend in the eastern part of the village, is within 100 feet of a very offensive nuisance made by keeping pigs in filthy surroundings. Upon complaint of the neighbors — not the school trustees — the local board of health has ordered it abated and work on the same has been begun — though not in a very effective manner.

The refuse from the gas-works — crude petroleum — is complained of by some of the residents near by. The attention of the gas company has been called to it, and I presume they will take measures to remedy the evil The location of the gas works is a very unfortunate one, being near the most desirable portion of the village for residences. It should be removed — when practicable — to a less objectionable part of the village.

BOARD OF HEALTH.

There has been a local board of health for some years, who have been appointed with a view of not disturbing anybody by their action. They would meet and pass ordinances and there their efforts practically ended. For the past few years the president of said board handled guano and stored it within the corporation for convenience, so could not consistently interfere with the other three or four guano depots, slaughter-houses or other nuisances, and thus the people put up with a state of affairs that are a disgrace to them individually and as a village.

By mistake — rather than intent — a board was appointed this last year, the members of which are above the average in efficiency and have listened to complaints and would gladly remedy them where they can, but have not the support of the influential portion of the community. They have no money on hand to pay for any work ordered, and are a little weak in their courage. Two of the three have in former years been interested in slaughtering in the village, and maintained nuisances themselves, of which fact they are reminded when asking their neighbors to abate similar ones, still they will doubtless do their duty with a little encouragement. As they receive no pay for their services they are loth to proceed in cases where an expenditure of money is necessary, [illegible] the animosity of their former friends and acquaintances their o[illegible] reward.

They are accused of sinister motives in the orders they ha[illegible] already given and to show their impartiality they should cause thorough sanitary inspection of the whole village and proce[illegible] against all offenders. It would cost considerable to put the villa[illegible] in good sanitary condition, but would be the best investment th[illegible] can make at present.

THE SLAUGHTER HOUSES.

This is the direct cause of complaint. Thirty years ago — more or less — the slaughter-houses of the village were located as at present, on the south side of the creek in the south-east part of the present village and then outside the corporation. That portion of the village was extended a few years ago to the limits shown on the accompanying sketch. Within the past two years a railroad has been constructed through the valley along the line of the old canal, and advantage taken of the fine water power along the stream in the building of extensive paper and other factories at an expense of several hundred thousand dollars, and the village would naturally grow eastward along the stream and will do so in the near future without doubt.

At present there are three slaughter-houses in this vicinity — one has not been used for a month or so — at the other two most of the slaughtering is done for the village markets and some for the Willard Insane Asylum east of Seneca Lake. There is a village ordinance requiring all slaughtering to be done outside the corporation, and although a patient and enduring public have complained at various times before, the local board of health is now so constituted as not to hear or recognize them for reasons set forth above. The butchers claim that they are being persecuted without cause; that they have slaughtered there for many years; that while located there nearly all the property near them has changed hands; that people buying said property knew that the slaughter-houses were there when they bought; that they keep their houses as clean as ever they did; that the members of the local board of health who they supposed were their friends have "gone back" on them; and that they are being made the victims of a political intrigue. A good many of their friends, some of whom are men of influence and live among other "smells" than those of slaughter-houses, in other parts of the village, are disposed to side with them against the local board of health; among said friends may be found those who have been ordered to abate nuisances of some kind by said board.

The complaints claim that the butchers are violating an ordinance of said board of health, that they maintain a nuisance, the stench of which makes them sick; makes it necessary to remain indoors with closed houses these beautiful summer evenings; that the efforts lately made by the butchers to clean up are temporary and carelessness will soon be the rule if they "let up" at all; that the village would be healthier and more attractive were they outside of it; that it is a matter of a short time when they will have to move outside the corporation; that the improvements in the way of buildings, etc., are of nominal money value (not over $1,000 besides the land for all of the three slaughter-houses); and no great distress will accrue to the butchers if compelled to move outside now; that if they are not put outside the corporation while

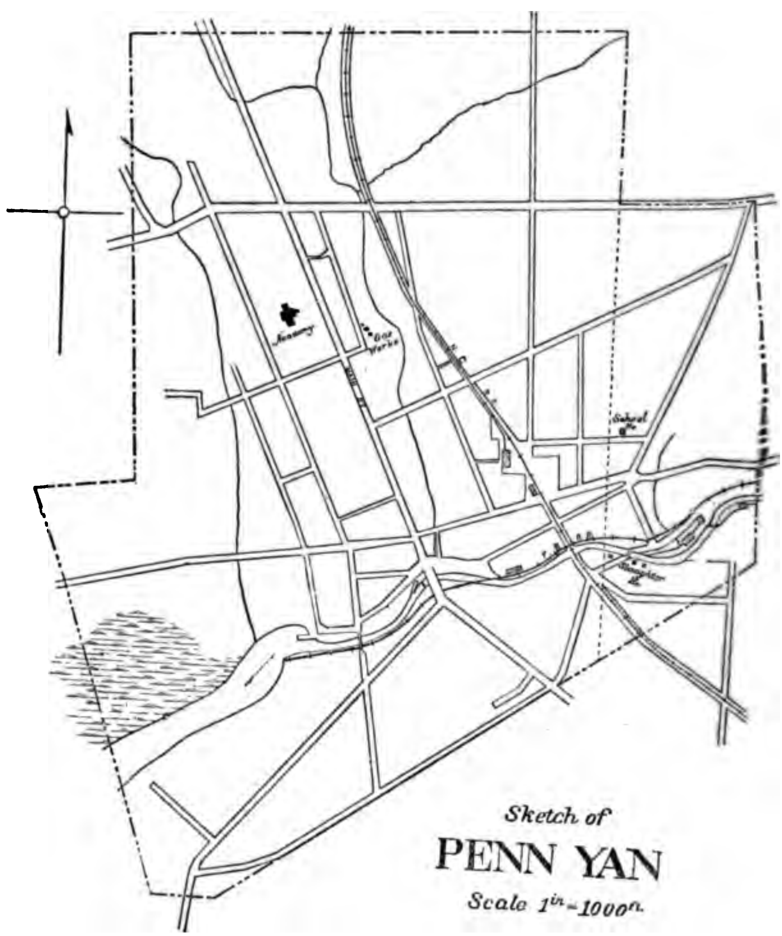
the present board of health holds that the butchers will "fix" the next board so as to render their exclusion more difficult (there is harmony of sentiment on this point); and that they have stood the nuisance as long as they deem it necessary.

I believe the above to be a brief statement of the situation regarding the slaughter-houses, and as my instructions were to collect facts I will only add that the butchers had at a large outlay of money been busy cleaning up about said slaughter-houses, spreading slacked lime about, etc., for a week preceding, and that I felt highly flattered by the preparations made by the butchers for my reception as an inspector sent by your honorable Board.

Very respectfully, your obedient servant,

O. S. WILSON.

ALBANY, *September* 6, 1886.



Sketch of

PENN YAN

Scale 1in = 1000ft.

:EPORT ON THE WATER SUPPLY OF THE CITY OF KINGSTON.

EWIS BALCH, M. D., *Secretary State Board of Health:*

SIR.—In response to the request of the board of health of King-;on, and in accordance with your instructions, I visited Kingston uly fourteenth, and in company with the local board, the mayor f the city, the superintendent and engineer of the water-works nd other citizens, made an examination of the line of main pipe, ie reservoir, and the brook running into it which furnish the ublic water supply of Kingston. The water was examined in ie city and the reservoir and samples taken for analysis.

I also conversed with a number of citizens as to the reasons for omplaint of the water.

It appears that several weeks ago the water in the city on cer-ain days developed a strong disagreeable odor and taste which is escribed as "fishy." At times also the water, especially in ondout, the lower part of the city becomes very roily. Even in ie upper part of the city, where excessive amounts of sediment ave not been usual, the odor and taste of the water have been so fensive at times as to compel people to resort again to their wells r potable water. The concurrence of testimony of many witnesses aces these facts beyond dispute.

HYSICAL FEATURES OF THE WATER-SHED, STREAM AND RESERVOIR.

The water-works of Kingston are owned by a private corpora-n. The supply comes from a reservoir made by damming the w Kill, a large creek, about seven miles north-west of Kingston. e stream has a large water-shed, the upper parts of which include forest-covered flanks of Overlook Mountain, one of the higher ks of the Catskills. The topography of the water-shed is largely roken hills with steep rocky slopes often covered with woods. g the valleys and over the more gently rounded hills the d is cultivated, but on the whole the water-shed has an ally large proportion of rocky and wooded hills as compared others used for water supply purposes. The underlying rocks ghtly inclined strata of the hard argillaceous shales known lue stone" so extensively used for sidewalk pavements. re hard enough to retain the glacial striations. The soil of ter-shed is largely morainal gravel and finer material. onditions are all favorable to the absorption and retention water by the ground, and the consequent maintenance of ummer flow in the springs which furnish the entire water aw Kill during the low water period. The bed of the generally either of large pebbles or solid rock, the harder which form little falls and rapids, and below them the urrents have excavated large pools.

The upper part of the stream is down precipitous slopes and the lower ten miles has a fall of some 450 feet to Esopus creek. The reservoir in the town of Woodstock is 175 feet above the city of Kingston, and the village of Woodstock, three miles above the reservoir, is about 260 feet higher in elevation. These features of the channel are very favorable for purifying water by oxidizing organic matter in the falls and rapids, and by sedimentation in the pools.

Excepting at the village of Woodstock there are very few houses on the water-shed. In the first three miles above the reservoir there are only three or four houses near the main stream or any of its tributaries. The reservoir itself has no swampy ground about it and no unusual amount of shallow water. The shores are pebbly and comparatively free from vegetation. The bottom of the reservoir is coated with fine mud deposited from the stream, which rises rapidly and becomes turbid in time of rain. The reservoir is, perhaps, 1,200 feet long by 500 feet broad. It is said to be thirty feet deep in the middle. The shores slope gradually down to the edge of the central channel.

CONSTRUCTION OF THE GATE-HOUSE, FILTER AND MAIN.

In the reservoir just above the dam is a gate-house arranged with three chambers or wells approximately five feet square. Into the first the water is admitted by three inlet pipes closed with valves, one intended to draw water from ten feet below the surface, one from twenty feet and one from the bottom.

The water from the first two pipes enters the first well or chamber and passes thence into the second through a wire screen with half inch meshes. The opposite side of this central well is also a similar wire screen. They extend fifteen feet below the surface of the water. The five foot space included between them is filled with large pebbles averaging from two to three inches in size, although many are larger. The water from the inlet gate well passes horizontally through this coarse filter or screen of pebbles, into the third well or chamber from the bottom of which it flows into the main pipe, which conducts it seven miles to the city. The water from the lowest pipe of the three at the gate chamber, which draws from the bottom of the reservoir, does not pass through the screens, but is discharged either into the creek below the dam or into the city main by means of cross-over pipe and proper valves. Water from the reservoir may therefore come to the city through the screens, or may pass round them through this lowest pipe. The twelve-inch iron main which carries the water from the reservoir to the city follows the undulations of the ground, and, owing to the rocky character of the hills, it is always near the surface, and sometimes merely covered with a foot or two of loose stone.

CONDITION OF THE PEBBLE SCREEN OR FILTER.

My visit was made near the close of an unusually long dry riod. There had been for many weeks no freshets to bring wn exceptional quantities of sediment. The local board of health d previously visited the reservoir and criticised the condition of pebble filter, the pebbles of which had never been changed. e members of the board say that at the time of their visit there s a deposit of some five inches of mud on the top of the pebbles. hen I examined the filter about eighteen inches of the upper nes had been taken off and lay on the rock near by. They were st examined and found covered with masses of fine mud filled th decaying fragments of leaves, stems, roots, and other bits of getable material. We then proceeded to the gate house. When cover of the filter chamber was raised and the water drawn wn a very strong and disagreeable odor of decaying vegetable tter rose from the filter. I then dug down into the stones on exit side of the filter where it should have been cleanest. e interstices between the pebbles were largely filled with strong elling mud full of decaying fragments of vegetable growth, some hem as large as half of a leaf. Many of these fragments were ayed to blackness. About a million of gallons of water a day now passed through these pebbles, the force of the current intaining open channels through the mass of filth in the erstices.

The water passes through the filter at whatever rate it is drawn the city, or, when let in after being drawn off it goes through filter under a head of some twenty feet. Were it not for this werful current the filter would clog up and have to be cleaned. it is the filter has accumulated, as a permanent filling, all the h it will hold in a strong current. Any surplus deposited in the er when the current is slow is simply driven through when the ce increases into the main, where it is either deposited or carried ng to be served to consumers in Kingston. The water, how- r, in passing through these pebbles carries with it into the main e not only such sediment as it may have brought from the rvoir, but it must take up also products of putrefaction from filter itself. The reservoir was visited about three o'clock in afternoon. In the evening at a house in Kingston, I drew, r letting the faucet run, a bowl full of water, in which the odor he filter was distinctly perceptible.

rom these facts it is clear that the pebble filter or screen no er prevents the passage of impurities into the main, but is itself ng as a source of pollution to the water.

CONDITION OF WATER IN THE RESERVOIR.

he water in the reservoir *appeared* to be free from suspended eral matter, but was yet so turbid that the bottom was not ble in two or three feet of water, six feet from the shore. The

color was greenish brown. There was no odor to the water at a temperature of above seventy degrees. No vegetable growths, large or small, were visible on the surface of the reservoir. I took for analysis a sample of the water in a new half gallon demijohn with new cork, being careful to rinse the demijohn in the water of the reservoir. I was informed by the health officer that, at the time of his visit to the reservoir, soon after the first serious complaints of the bad taste and odor in the water, the bottom of the reservoir was bare, and that many dead fish were visible upon it. In the presence of the common council, the superintendent of the water works, is said to have declared that the "sunning of the bottom of the reservoir made it sweeter." A well-known gentleman who resides at Woodstock, informed me that during the past month or six weeks he had seen the reservoir constantly drawn down and then allowed to fill again.

Mr. Low, the superintendent, informed me that for the last month, while some changes have been in progress in the channel of the stream below the dam, the running of surplus water from the reservoir during the day interfered with working in the creek bed. The keeper has, therefore, been in the habit of drawing down the water of the reservoir at night and then letting it slowly fill during the next few days. When the water is drawn down Mr. Low says that shallow pools remain on the flat parts of the reservoir bottom, and that the stagnant water in these exposed to the hot sun soon becomes very bad. On refilling, when the water rises high enough, the stagnant pools are taken into the water supply. The superintendent says no vegetation was to be seen growing on the bottom of the reservoir, but it is well known that on such rich mud bottoms in shallow waters, a luxuriant mass of minute and microscopic aquatic plants grow very fast when the water becomes warm. There are also large numbers of minute animals living on or near the mud. The drawing down of the pond will in a few hours destroy these organisms. When the reservoir water again rises the dead and decaying organisms will be taken into the water supply and render it impure. If dead fish were left on the pond bottom these also would add to the pollution of the water.

Although the minute growing plants on the pond bottom will be killed by drawing down the water, a new growth will occur when the water rises, this in its turn will die, decay and be taken into the water supply as the water falls and rises again.

The conditions resulting from this process might also favor the growth of algae, whose decay in the water would give it an offensive odor and taste, and perhaps produce diarrhœa.

CHEMICAL ANALYSES OF WATER.

It being important to discover just what results had been brought about by the unfortunate methods employed at the Saw Kill reservoir, the samples of waters taken from the reservoir and

the city were submitted to chemical analyses, and the sediments microscopically examined by Dr. Tucker and by myself. The samples were both shaken before analysis and not filtered so as to be as nearly as possible in the condition of the water when taken from the reservoir and pipes.

In Table I is given the result of Professor Tucker's analysis of the reservoir water and his remarks thereon. In Table II is given the result of the analysis of water drawn from a faucet at the house of Dr. G. W. Cooke in Kingston about seven hours after the sample was taken from the reservoir. In Table III is given the result of an analysis of the water at Dr. Cooke's house in October, 1885.

TABLE I.

ANALYSIS OF POTABLE WATER.

(Parts in 100,000.)

Source, Saw Kill reservoir, Kington water supply.
Date when received, from J. T. Gardiner, Esq., 7, 15, 1886.
Color and appearance, turbid, greenish brown, brown sediment.
Odor at 100 degrees F., very disagreeable.

Chlorine	0.30
Free ammonia	0.0013
Albuminoid ammonia	0.0105
Total solids	4.00
Loss on ignition	1.80
Mineral matter	2.20

Remarks: Appearance and odor, bad; chlorine and free ammonia, low; albuminoid ammonia, rather high; total solids and loss on ignition, low. These results would seem to indicate that the organic impurity is of vegetable rather than of animal origin.

WILLIS G. TUCKER,
Public Analyst.

Dated *July* 15, 1886.

TABLE II.

ANALYSIS OF POTABLE WATER.

(Parts in 100,000.)

Source, Kingston city water faucet in Dr. Cooke's house.
Date when received, from J. T. Gardiner, Esq., 7, 16, 1886.
Color and appearance, light greenish, transparent.
Odor at 100 degrees F., very slight.

Chlorine	0.30
Free ammonia	0.0007
Albuminoid ammonia	0.0035

Total solids	3.60
Loss on ignition	1.60
Mineral matter	2.00

Remarks: The above results would indicate a water of great purity. The analysis, however, is by no means exhaustive.

WILLIS G. TUCKER,
Public Analyst.

Dated *July* 17, 1886.

TABLE III.

ANALYSIS OF POTABLE WATER.

(Parts in 100,000.)

Source, Kingston city water, Kingston, N. Y.
Date when received, from Dr. G. W. Cooke, October 6, 1885.
Color and appearance, clear, light-greenish tint.
Odor at 100 degrees F., none.

Chlorine	0.30
Free ammonia	0.0047
Albuminoid ammonia	0.0055
Total solids	4.00
Loss on ignition	2.50
Mineral matter	1.50

Remarks: Water of good quality as judged from above analytical results.

WILLIS G. TUCKER,
Analyst, State Board of Health.

ALBANY, *October* 9, 1885.

Regarding the microscopic examination of the water, Dr. Tucker reports as follows: "The sediment of the reservoir water consists chiefly of vegetable debris and some mineral matter with many living organisms, including various rhizopods, infusoriæ (Monads, englenia, œrides, etc.), and other living forms."

The analyses show that while the water of the reservoir is turbid and of greenish brown color, the better water in parts of Kingston is transparent and only slightly greenish; that while the reservoir water had a very disagreeable odor when heated to 100 degrees F., the city water *at this time* had only a slight odor; that the reservoir water had much sediment while *this sample of city water* had little; that both waters have very little chlorine or mineral matter; that the city water when clear contains only thirty-five per cent of the organic matter contained in the reservoir water, the total amount of organic matter being very small.

TURBIDITY OF WATER IN THE CITY.

I brought with me a bottle of the most turbid water of Rondout. After standing a short time it was clear and bright, but one-fifth of an inch of sediment had been deposited from a depth of four inches of water. The sediment was largely organic matter.

It seems that within twenty-four hours of the time this water was drawn there had been two large fires in Rondout, and the pipes had been heavily drawn upon. The unusually rapid current thus produced in the mains doubtless caused the water to take up sediments which had been previously deposited.

The analyses and observed facts taken together prove that the reservoir is rendered turbid by organic matter in *suspension*, and that, by a process of sedimentation in the mains, the water frees itself of two-thirds of this matter when the current in the main is slow. When, for any reason, the current in the mains is materially increased the water will not only cease to purify itself, but will take up sediments before deposited. The result will be a turbid and impure supply to certain parts of the city.

DISAGREEABLE ODOR AND TASTE OF WATER IN THE CITY.

When the reservoir water is heated to 100 degrees F., it gives off a strong and very disagreeable fishy odor and has a similar unpleasant flavor. This is undoubtedly due to the effect of heat in decomposing the dead organic matter suspended or floating in the water, and not to organic matter in solution; but the disagreeable products of this decay are at once dissolved and will contaminate a very large amount of water with a disgusting taste and odor from which it cannot free itself in pipes.

This sort of pollution, if it took place in the main from the reservoir, would be likely to reach all parts of the city. The decay of the organic matter, of course, begins at ordinary temperatures and the rate increases as the temperature rises. I have before shown that at the time of the occurrence of the strongest odor and taste in Kingston the water was low in the reservoir, and that the seven miles of main from the reservoir to the city are, in many places, so near the surface of the ground that the water will be affected by the temperature of the air. In the great heat of early July it is, therefore, probable that decomposition of the organic matter in the water and in the main proceeded rapidly enough to pollute the whole supply of the city.

CONCLUSION RESPECTING THE CAUSE OF THE OCCURRENCE OF DISAGREEABLE ODOR AND TASTE, AND OF THE TURBIDITY OF THE WATER.

The primary cause of both the turbidity and the disagreeable odor and taste of the Kingston water is thus shown to be the dead organic matter in *suspension* in the reservoir. Its excessive

amount is doubtless due to the continual raising and lowering of the reservoir, during the hot weather when the growth and decay of vegetation proceed with greatest rapidity. The putrescible matter thus taken into the water is not removed by the so-called filter of pebbles, but, passing through is deposited by sedimentation in the pipes where the currents are sluggish. When the draught on the pipes becomes so heavy as to materially quicken the current, a part of the sediment will be taken up by the water and render it turbid. But these sediments are principally organic matter and will surely decay with greater or less rapidity when the temperature of the water becomes high, the decay of organic matter in the water may go forward fast enough to impart a strong and repulsive odor and taste.

In addition to the variable process above described, the filthy condition of the pebble filter imparted constantly a perceptible odor and taste to the water of the whole city.

EFFECTS ON THE PUBLIC HEALTH.

The condition of the water supply in Kingston must vary greatly in different localities and at different times, owing to the causes above described. At various times and places the water is liable to contain so much decaying vegetation and products of decay as to be injurious to health, while under other circumstances it is doubtless quite pure.

When the water becomes disagreeable the confidence of the people in its wholesomeness is destroyed and many return to drinking well water, which, in the unsewered city of Kingston is eminently dangerous.

The interests of the public health, therefore, demand that the water supply should be kept *uniformly* in a wholesome and palatable condition.

REMEDIES.

To accomplish this the water in the reservoir should, during the warm months, be kept as deep and as nearly at the same level as possible, and the filter should be kept clean. No screen or filter should be used that cannot be constantly cleaned, and the condition of these supposed purifiers should be officially inspected from time to time.

How thorough the filtration would need to be under ordinary circumstances it is impossible to determine when the water is subject to the exceptional conditions occasioned by raising and lowering the reservoir.

The frequent and thorough blowing off of the pipes in the city will be necessary to free them of decaying sediments.

SEWAGE POLLUTION.

The village of Woodstock lies some three miles up the Saw Kill above the reservoir. As the brook runs the distance is probably five miles. Just at this point a number of small branches come together to form the main stream. The little brooks run through most of the back yards of the hamlet, where little care is taken to prevent their defilement. Pig sties and privies are on the brooks or close to them. On the south branch there is a small slaughter-house and some barns. Several house drains pour their filth into the water, or what is worse, on to the banks or pebbly shores of the brook, and the stream is commonly used for washing soiled clothes, the water being dipped into tubs standing close to the brook and the dirty water being emptied into it.

One of the house drains belongs to Dr. Smith, the health officer of the town. When I visited it a year ago the sewage from this house was emptied by a drain on to a flat rock overhanging the Saw Kill. There it putrified in the sun so that the odor from it was perceptible at some distance. The overflow from the shallow green pools on the rock was passing into the stream. Dr. Smith was notified that the evil must be remedied. He has altered his drain so that it now empties directly into the water, before the sewage putrifies. His own neighborhood is therefore less odoriferous than before, but the stream is still polluted by his sewage, which consists of house slops.

Mr. Edgar Snyder, the postmaster, and one of the wealthier citizens of the place, has a drain carrying all the sewage from his house and emptying on to the pebbly shore of the brook under a street bridge. He was notified a year ago that this could not continue. He has not only made no change, but the drain outlet has become very much worse, and is now a nuisance to the village itself. A mass of black and putrifying matter has become spread over the shores and channel of the brook opposite and below the outlet, the stench from which could be detected at a distance of 100 feet.

While the run of the brook for five miles with a distributed fall of 260 feet, is doubtless a great purifier, and while the amount of sewage entering the brook is small, yet neither of these conditions render the reservoir secure against the entrance of specific germs of disease, if these be allowed to enter the stream at Woodstock.

Water and *ice* may both be the carriers of pathogenic germs which by their power of enormous self-multiplication, under favorable conditions, sow the seeds of an epidemic broadcast in communities whose water supply is thus contaminated. The history of the Plymouth epidemic suggests that such spores or germs may remain frozen in snow or ice for weeks, and passing into reservoirs with a spring freshet, may even at that season cause fatal epidemics. Sanitary science clearly negatives any assertion that a distance of five miles between the point of sewage contamination

and a reservoir is sufficient protection to the water from the specific germs of disease. The law has recognized the paramount importance of protecting the potable water supplies of the State from every source of pollution, and for this purpose has empowered the State Board of Health to make such rules and regulations as are necessary to prevent the pollution of any public supply.

RECOMMENDATIONS.

I strongly advise that this power be used as has been requested by the city of Kingston, for its protection, since I find the water supply has been polluted by a filthy filter, by improper raising and lowering of the water of the reservoir in hot weather, and is endangered by sewage contamination of the brook in Woodstock.

The appended rules and regulations are suggested and recommended for adoption by the State Board of Health, as necessary to meet present and probable sources of pollution of the Saw Kill and the reservoir which furnish the water supply of Kingston.

Very respectfully submitted,

JAMES T. GARDINER,
Consulting Engineer.

ALBANY, *July* 26, 1886.

RULES AND REGULATIONS FOR THE SANITARY PROTECTION OF THE SAW KILL AND THE RESERVOIR FURNISHING THE PUBLIC POTABLE WATER SUPPLY OF THE CITY OF KINGSTON.

Privies near Streams, Springs or Water-courses.

RULE I. No privy shall be located within thirty feet of any spring, stream, or dry water-course, the water from which when running empties eventually into the Saw Kill above the reservoir.

RULE II. Any privy situated within fifty feet of any stream, spring, or dry water-course, the water from which when running empties into the Saw Kill above the reservoir, shall be constructed without a vault, and shall have under the seats half barrels, tubs, pails, or water-tight boxes or troughs arranged to be easily removed, emptied, cleaned, and returned to their places under the privy seats. Ashes or dry earth should daily be used in these privies as a deodorizer and absorbent.

RULE III. (Section A.) The owners or occupants of premises having privies with tubs, pails or boxes, shall cause the contents to be removed and the receptacle to be cleansed as often as is necessary to keep the privy in such sanitary condition that no pollution of the soil shall occur.

Section B. The contents of the said privies shall be disposed of in such a manner that they cannot be washed into any stream,

dry water-course, ravine, spring or well on the Saw Kill water-shed, either over the surface or through the subsoil, and the excremental matter shall be so placed as not to cause an offensive nuisance.

RULE IV. If, owing to the porous character of the soil, the height and flow of the surface or subsoil waters, the steepness of the slopes, or other conditions of the locality, it shall be the judgment of the local board of health, or of the State Board, that the excremental matter from any privy may be washed on the surface or through the soil into some neighboring spring or water-course tributary to the Saw Kill, then after due notice to the owners or occupants of these premises, their privy shall be made to conform to the rules governing privies situated within fifty feet of water-courses.

House Slops, Sink Wastes, Laundry Water and other Sewage.

RULE V. (Section A.) No sewage, house slops, sink wastes, water in which clothes have been washed or rinsed, nor any other polluted water shall be discharged or thrown into any stream, spring or dry water-course on any part of the water-shed draining into the Saw Kill and the reservoir; nor shall any such polluted waters be thrown upon the ground or into it where there may pollute any spring, stream or water-course on this water-shed.

Section B. Neither clothes nor any thing which pollutes water shall be washed in the springs or streams which flow into the Saw Kill and the reservoir.

Garbage.

RULE VI. No garbage shall be thrown into any spring or stream on this water-shed, nor shall any such substances be placed where they may be washed into these springs or streams.

Animal Manures.

RULE VII. No stable, pig-sty, hen-house, barn-yard, hog-yard, hitching or standing place for horses, or other place where animal manure accumulates, shall be so constructed, located or maintained, that the manure or leachings from it may wash into any spring, stream or dry water-course running into the Saw Kill and the reservoir.

Animal and Vegetable Matter.

RULE VIII. No dead animal, bird or fish, nor any filthy or impure matter, nor any decayed fruit, vegetable substances, leaves, sawdust, roots, branches or trunks of trees, in any condition of their growth or decay, shall be thrown into any spring, or stream on this water-shed or into the reservoir.

Manufacturing Wastes.

No waste products, putrescible matter or polluted waters from any slaughter-houses, cheese factories, wine or beer vaults, cider mills, tanneries, saw-mills, or other manufactories shall be thrown or allowed to run into any pond, spring, stream, or dry water-course, on any part of this water-shed.

Washing Sheep or other Animals.

RULE IX. No sheep or other animals shall be washed in the reservoir or in any influent stream within five miles of it; nor shall any diseased animal be washed in any spring, pond or stream on this water-shed.

Management of the Reservoir.

RULE X. The reservoir shall not be unnecessarily drawn down during the warm months, but shall be kept as deep and as nearly at a uniform level as practicable to prevent the pollution of the water with dead organic matter.

RULE XI. No filter or screen shall be used when in a filthy condition and liable to pollute the water in the main; and no filter or screen shall be used at the head of the main which cannot be constantly examined and cleaned.

Penalty.

In accordance with chapter 543, of the Laws of 1885, a penalty of fifty dollars is hereby imposed upon any person or persons guilty of violation of, or non-compliance with any of the above-given mandatory rules or regulations, to be recovered under said act.

Approved by order of the State Board of Health.

EDWARD M. MOORE, *President.*
LEWIS BALCH, *Secretary.*

REPORT ON THE PROTECTION OF THE WATER SUPPLY OF THE VILLAGE OF NORWICH, CHENANGO COUNTY, NEW YORK.

To LEWIS BALCH, Esq., M. D.,
Secretary State Board of Health:

DEAR SIR. — In accordance with directions I visited Norwich, Chenango county, to examine the question of the protection of the water supply of that place from pollution. I left Albany on the nineteenth instant and reached Norwich on the twentieth of November when the inspection was made. During the previous ten days there had been heavy storms both of snow and rain, so that the ground was saturated and the chances for observation of the flow both of the surface waters and the springs of all sorts was excellent.

The public supply of water for the village of Norwich is furnished from a small stream which comes down from the hills into the Chenango valley. This small stream is dammed at a sufficient height above the Chenango valley, in which Norwich is situated, to give an excellent head of water to the town. The hill slopes on either side of the reservoir are quite steep, and of such a general character as to favor proper water storage. One bank of the reservoir is unusually steep. On this side the water was shallow, but since the visit of the inspector sent by the State Board of Health in September, a stone wall has been constructed along the shallow side of the reservoir and the bottom has been dug out so as to obtain deeper water. At the time of my visit the stream was in a flood so that it was impossible to determine whether the water has been sufficiently deepened to provide for proper storage.

I could see nothing in the topography or geological conformation of the ground to interfere with the making of this reservoir a proper one for water storage, but I could not determine in the present stage of water whether everything has been done which is necessary to this end. The health officer who visited the ground with me informed me that the company were anxious and had ample means to do everything that was necessary in the way of deepening the reservoir, thoroughly cleaning the bottom and putting the banks into such condition as not to present favorable opportunity for vegetable growths along the margin.

The purity of the water in the reservoir is, however, threatened by the surface washings from the premises of eight houses, some of which have barn yards and hog yards, all of which are situated along the road which lies on the slope above the reservoir and runs parallel with it.

It was clearly evident at the time of my visit that some of these premises are now polluting the reservoir in a very decided manner.

Just above the houses and barns that lie on the upper side of the road is a belt of springy ground, from which a large amount of water flows when the soil is saturated. This class of springs was doubtless dry in September at the time of the previous inspection. Now they are running quite a quantity of water directly through barn yards and other places where animal manure, accumulates and discharging down the bank either into the reservoir or into the brook which is above the reservoir. An examination of the water of these streamlets just above the barn yard and below, or of the waters of those that did not pass through barn yards and those which did, prove them to be grossly polluted. They were actually turbid with the dissolved animal matters carried down.

The simplest remedy that I can see, and a very necessary one for protecting the water of the reservoir from pollution, is the building of an intercepting ditch between the road and the reservoir which will take all the surface washings from a point near the fork of the road above the reservoir down to a point below the dam where all the collected waters may discharge into the creek. By this method all danger of contamination of the water from the premises above mentioned may be prevented at a comparatively small cost.

The next point where the purity of the water is threatened is just at the fork of the road above mentioned where stands a school-house having a privy near and a short distance from the stream and on a bank, so that any washing from the privy goes into the brook. The brook here spoken of is the north fork of the stream. The south fork has no road along it and no human habitations or other sources of pollution, according to information of the health officer who accompanied me and who seemed very familiar with all the facts connected with this matter, having made a number of inspections.

The school-house privy should be removed as far as possible from the stream. A water-tight box or half-kerosene barrel should be placed under the privy seat and should be removed and cleansed once a week. Ashes may be used to deodorize it necessary, but no human excrement should be allowed to go into the ground within 100 feet of the stream in such a porous soil.

From here up, the north fork runs through woods and appears to be in no danger of contamination except at one point known as the Giles farm. There I found a house with barns, pig-sties, barn-yards and hog-yards, situated perhaps sixty feet from the stream, and in the stream valley not more than five or six feet above the brook bed. Just behind the buildings the hill rises very steeply.

Along the foot of the hill and just above the barns is a line of springs and springy ground, the water from which flows even in summer. It runs down through the barn-yards and hog-yards, and in a grossly polluted condition enters the brook. In Septem-

ber the health officer informed me that the brook at this point contained no water. In fact that this dung polluted spring was the head waters of the north fork of the stream which supplied the reservoir, the distance to the reservoir being no more than a mile and a half.

The topography and land ownership is such that I could see no practicable way of removing these buildings or barn-yards to a point where they would be less dangerous to the brook and still accessible from the house. A simpler remedy, and I think an efficient one, would be to run a deep ditch along the foot of the hill back of the barns and barn-yards, carrying the ditch to the brook so that the spring water shall be collected and discharged without running through the barn-yards. Another ditch not connected with the first should run around the barn-yards so that all the rain-water falling on the barn-roof and yards should be collected in this ditch. This ditch should not discharge into the brook, but into a little hollow which lies just between the lowest barn and the brook. By putting an earth dam around this little hollow, the rain-water that falls on the barn-yards and runs off can be filtered through the earth before it reaches the brook. The quantity of this water will be very small as the barns and yards only occupy a square of about 100 feet. The small amount of water collected from such a surface can readily be made pass into the ground; and if it reaches the brook at all will reach it after filtration through the earth that will thoroughly purify it, it being borne in mind that this source of pollution, namely the off flow of rain from the barn-yards will only occur in case of heavy rains and melting snow. In general, I may say that the sources of water which supply the Norwich water-works come from springs having their source in the shale rocks, the springs themselves being at no great distance from the reservoir. The channel of the brook has a heavy fall, so that the advantages of an æration in rippling over stony rapids and falling over abrupt descents are fully received.

If the water is protected from the sources of pollution above mentioned, and the reservoir deepened and its bottom and margins kept clean, there seems a fair probability of good potable water being obtained. But even after all this is done, it may be that owing to certain natural conditions which are beyond the control of the company, growths of offensive algæ may take place or pollution from natural vegetable sources may occur, owing to the lowness of the water or washings of vegetable growths into the stream or reservoir which may render filtration necessary in order to secure water of the best quality. This question can, I think, only be tested by a summer's experience after the execution of the methods above described for protecting the water.

RECOMMENDATIONS.

I should advise the putting of the reservoir into the most perfect condition for securing the purity of the water, the building of ditches on both sides to prevent surface washings from the neighboring hills, the prevention of the pollution at the Giles farm and the school-house, the cleaning of the channel, both of the north and south forks. All this being done as soon as practicable.

The best technical advice should be secured by the company in the preparation of the reservoir, with a view to securing every possible advantage that can be obtained in this way. The water should then be given a trial during a wet and dry season to see if it is pure and palatable.

If it is not then satisfactory, filtration must be resorted to, and no filter should be used which cannot be constantly and readily and thoroughly cleaned. The best method is filtration through sand alone. This is accomplished in the simplest way by filtering basins, which in the case of the Norwich works, would be, perhaps, eighty feet square in which three or four feet of sand rest on coarser material, the water being allowed to filter slowly through the sand and being drawn off beneath the underlying coarser layers. Several such beds will be necessary so that some might be cleaned while the others are in use. The cleaning is done by drawing off the water and shaving off the upper layer of sand with a shovel, this process is repeated until the sand layer gets so thin that the filtration is no longer effective, the whole remaining mass of sand is then removed, thoroughly washed, and the filter restored to its original condition.

By this simple means the water of London is most thoroughly and effectually filtered; but the whole success of the measure, from a sanitary point of view, depends on the care which is exercised in keeping the filters clean and in not forcing the water through them at too rapid a rate. Such filters should not be required to filter more than from ninety to 100 gallons per day to each square foot of filtering surface. The ground below the dam is well adapted to the construction of such filter beds. Of course the proper filtration of the Norwich water would undoubtedly improve its quality both in times of flood and drought, but owing to the cost of the processes, I hesitate to declare it to be necessary from a sanitary point of view until the result of the other measures, which certainly are necessary, has been ascertained.

At the request of the president of the Board of Health I made a reconnoisance of the town of Norwich, with reference to the necessity of sewerage. I found the subsoil water seldom more than from ten to twelve feet below the surface and sometimes within four or five feet. The water bearing stratum is undoubtedly very porous, and a large part of the filth of the privies and cesspools and yards of the place must go into solution in the ground.

This will be especially true since the introduction of a public water supply, which generally causes the use of from five to eight times as much water as would be consumed from wells and cisterns. The greater part of the water used by the people is fouled and polluted before it goes to waste. Unless proper measures are taken for getting rid of this polluted water that sinks into the soil, carrying with it a large amount of soluble filth, slowly both the soil and subsoil water of the town must become most grossly contaminated, affording most favorable conditions for the outbreak of disease. In fact there can be little doubt that some of the worst of the infectious diseases may become planted in the soil, and may reach the people of the town, not only through the water of the wells, but through the air of the cellars, which, especially in the winter, rises through the whole house. Unless sewerage is provided for the removal of the polluted water and soluble waste matter of Norwich, it can only be a question of time when the soil will become so saturated with filth that disease will inevitably result. Many of the cellars in certain parts of the town are damp, and in these regions the dangers are seriously increased.

As regards the method of sewerage, I strongly recommend, both on sanitary and economic grounds the use of the separate system, the sewers being constructed to carry sewage only, and that thorough subsoil drainage be provided for by proper means when the sewers are built. The surface water should not be allowed to enter the sewers, as the washing from the unpaved streets of the village would choke the sewers and soon render them filthy and unwholesome.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

The report was approved and a copy sent to the village of Norwich.

LEWIS BALCH,
Secretary.

REPORT ON POLLUTION OF WATER SUPPLY OF PORT JERVIS.

ROCHESTER, N. Y., *Nov.* 30, 1886.

Dr. LEWIS BALCH, Esq., *Secretary of State Board of Health, Albany, N. Y.:*

DEAR SIR.— On the 23d ult., I was requested by you to report at Port Jervis, N. Y., to Dr. H. Hardenburgh, health officer of the town of Deer Park, Orange county, New York, and act as your Board's expert in counseling the board of health of said town upon the matters referred to in their application to you, dated October 11, 1886. Learning that Dr. Hardenburgh was necessarily absent at this time, arrangements were made for a visit as soon as possible after his return, and the inspection of the nuisances complained of was duly made in his company, on the 10th inst. The questions at issue relate to the pollution of the public water supply of the village of Port Jervis by the drainage from two separate barn yards contiguous to the water-works reservoirs, which are located in the town of Deer Park outside of the corporate limits of the village. The circumstances connected with this case, as presented both by the health officer and the town board of health, are herewith submitted in the following report:

The flourishing village of Port Jervis, in the township of Deer Park, Orange county, New York, has a population of about 10,000, and is supplied with drinking water by a private corporation known as the Port Jervis Water Company. The water-works were built in 1870, after plans made by John B. Jervis, C. E., the supply being taken from two large storage reservoirs located in narrow valleys northerly of the village. In these two basins, the surface drainage and the waters of a number of brooks, rivulets and springs on the respective watersheds are impounded.

The first, or lower, reservoir is about 125 feet above the village, and is formed by an earthen dam, 224 feet long and about twenty feet high, across the valley, whereby an area of about twenty acres is flooded to depths ranging from four to eighteen feet, and a volume of about 70,000,000 gallons of water may be stored. The length of this reservoir is about 2,400 feet, and its width varies from 200 to 500 feet. Its bottom is generally rocky, and its margins are formed of vertical walls of rubble masonry, laid dry and averaging six feet in height. The adjacent hillsides are in general, quite steep, and are therefore not adapted for cultivation. They were formerly overgrown with timber trees, which have gradually been cut away, leaving the surface suitable only for grazing purposes or for the growth of trees and brush. Along the sides of the reservoir, there are no habitations of any kind; but at its head is located the farm of Bernard O'Gorman, which is leased by W. A. Coddington,

and which is conducted in such manner as to have given rise to complaints about the drainage waters from the farm buildings gaining access into the reservoir. This farm occupies the entire upper portion of the valley, and has several acres of alluvial lands capable of cultivation, together with a considerable area of hill-side cleared for grazing, the remainder being covered with trees and brush.

The general relations of this farm to the reservoir are shown on plate No. 1, and in detail on plate No. 2, hereunto attached. A reference to these maps will show that a small rivulet, fed by springs issuing from the steep hill-side above, runs directly through one side of the barn-yard, underneath a general watering trough for the animals, very close to the hen-house and the pig-pen, and thence, after a course of only about 250 feet, discharges into the head or upper end of the reservoir. For a portion of the distance through the barn-yard the brook flows in a covered stone culvert, as indicated on the map. The dwelling-house is so located that slops, which may be thrown out in the rear, can readily find their way into the brook by flowing over the bare surface of the intervening ground, but the occupant asserts that the liquid wastes of his household are disposed of in such localities as to make a contamination of the rivulet improbable. However this may be, it is clear that the sanitary authorities and the water company should take care that any pollution of the brook from domestic wastes be rendered impossible, except by deliberate intent. The method of accomplishing this end by means of sub-service irrigation pipes, and the diversion of such waste waters in a direction away from, instead of towards, the brook, was duly explained. The surface of the barn-yard slopes slightly away from the brook and its culvert; yet in times of heavy rain-fall there is little doubt that a large share of the washings from the foul surface, the stables, the manure heaps and the pig-pen will flow directly into the stream, and thence into the reservoir. My advice was to either entirely divert the brook, or else to remove the barn-yard, together with all of its buildings and appurtenances, to another locality at some distance from any natural water-course. Both plans are entirely practicable, and the choice between them is simply a matter of relative expense. Another element in the case is the treatment of the drainage from the barn-yard in its present position, or in some other convenient one, if it be removed as suggested, since in any event this drainage must ultimately reach the reservoir. By the operations of the water company the channel of the brook running through the valley appears to have been changed considerably, so as to leave a large alluvial area of the O'Gorman farm above the head of the reservoir lying between the aforesaid barn-yard and the present channel of the brook. This area is drained by means of a ditch cut across the bottom land and discharging into the first-mentioned rivulet, as shown on plate No. 2; and in times of freshets, or heavy rains, the swale or lowest portion of this bottom-land is

said to be completely submerged. It, therefore, becomes necessary to prevent a direct discharge of the barn-yard drainage into either the said rivulet or the drainage ditch. To accomplish this end, I suggested that the storm waters flowing down the adjacent steep hill-side be intercepted by a suitable ditch at the foot of the hill, and thence conducted into some convenient out-fall (either the rivulet, the drainage ditch or the main brook), instead of sweeping over the barn-yard and washing out the filth therein contained; also, that the drainage waters from the barn-yard, thus greatly reduced or limited in amount, be caused to flow over a strip of meadow land, not less than 200 feet in width, before reaching any out-fall. In this manner the comparatively clean water from the slopes will reach the reservoir directly, while the relatively small amount of foul water from the isolated barn-yard will undergo more or less thorough purification by a system of surface irrigation. If deemed more desirable, a system of sub-surface irrigation could here also be carried out, although its successful operation would involve much careful supervision.

It should be remarked that the above described barnyard and its adjuncts were duly declared to be nuisances by the town board of health and orders for the abatement of said nuisances were served upon the tenant, Mr. Coddington, on August 30, 1886. Instead of complying, Mr. Coddington consulted with an attorney, under whose advice he resisted action, and set forth the allegations that his said premises were not nuisances; that the rivulet was not polluted; that its waters were purer and better than those of the reservoir; that his said barnyard and appurtenances were in existence many years before the reservoir was constructed; that it was not incumbent upon him to make any changes or alterations of the existing conditions whatever, unless amply compensated therefor; that if any changes were needed, the same should be made at the sole expense of the water company; and finally, that the notices and orders of the local board of health had been improperly served. Under these circumstances, advice with regard to further procedure in the premises was sought from the State Board of Health.

In my opinion, the premises described may fairly and justly be considered as sources of pollution of a public water supply, and hence, also, as a nuisance likely to affect the public health. It is true that, up to the present time, no complaints about the quality of the water furnished to the citizens of Port Jervis have been made, nor has any sickness, attributable to the use of unwholesome water, been noticed by or reported to the health authorities of the village or town as occurring amongst the families supplied from the water-works; nevertheless, common prudence should dictate a proper modification of the existing conditions of the drainage from said premises, since it cannot be foreseen how soon the evil effects of a continuance of these conditions will become manifest.

I have therefore advised the local board of health to persist in their efforts to secure an improvement in said conditions by proper legal procedure and to endeavor to obtain from the courts a decree requiring the performance of such improvement. Furthermore, in view of the fact that the water company owns a strip of land of considerable width all around the reservoir, and is thus a riparian owner along the rivulet which flows through the O'Gorman or Coddington barn-yard, the company could, of its own motion, compel the owner or occupant of the said premises to refrain from any unlawful pollution of that stream, or of any other natural water course which flows through the company's property. By these means all direct pollution of the waters entering the reservoir can be legally prevented.

It is possible, however, that the desired object can be attained without resorting to the law, if the water company should offer to perform the work indicated at their own expense. In the event of a failure to obtain the owner's consent to such an arrangement, the legal measures indicated could still be taken, and with better chances of ultimate success. Should these steps be unavailing the demand for a series of rules and regulations from the State Board of Health to govern the disposal of organic wastes on the entire water-shed of the reservoir, can always be made, and the relief derived from this source will be prompt and effectual.

A somewhat similar condition to that aboved described also exists at the upper or second reservoir of the water company. This storage basin is about three miles distant from the lower reservoir and nearly 400 feet above the level of the latter, and lies in an entirely separate drainage area. It was built about five years ago, and is used as a reserve to supplement the available yield of the other water-shed. It is formed by an earthen dam, 530 feet long and thirty feet high, across a valley high up in the mountains; and when full it covers an area of about thirty acres, and has a storage capacity of about 150,000,000 gallons. The greatest depth of the water is twenty-five feet, and the margins are simply the natural earth or rock surfaces. A considerable area of land all around the reservoir is owned and controlled by the company, as shown on plate No. 3. The water is drawn from this basin at a point about 900 feet from its head when full, and is carried over the low summit ridge, separating this valley from that of the lower reservoir by means of a siphon of cast iron pipe, 1,300 feet long; it is then discharged into the small brook at the head of the latter valley, and reaches the lower reservoir after a course of nearly three miles in a steep natural water-course, along the whole length of which the company have secured a narrow right of way from the owners of the territory. This district is still in a very wild condition as the slopes are generally quite steep and rocky, ill-adapted for cultivation, and overgrown with forest and brush. Between the two reservoirs there are no houses or barns, except the O'Gorman

premises mentioned above. At the present time the land is valuable only for the timber which may be standing upon it, and is rated at from ten dollars to twenty dollars per acre. The waters collected from such gathering grounds are accordingly free from any pollution from animal matter, but they doubtless contain a considerable quantity of vegetable substances, at certain seasons, and hence great care should be exercised to prevent further contamination.

The only human habitation near the upper reservoir is the farm house owned and occupied by Thomas C. Jansen, which, together with a couple of barns, is located on the northern side of the basin, nearly opposite to the intake of the water-works siphon, and about 150 feet from the water's edge. The natural drainage from these premises is into the reservoir, and the owner has been ordered by the town board of health to remove his barns and barn-yard to a point further back, but he has hitherto failed to comply, as in the case at the lower reservoir. The same questions as before accordingly arise in relation to the enforcement of the orders to Mr. Jansen, and the same answers are here also applicable without further discussion. As in the former case. I deem it expedient and prudent to prevent all possible pollution of the upper reservoir by the drainage from the barn-yard, and have recommended that the sources of contamination be removed at least 300 feet from the margin of the basin, in consideration of the fact that the slopes are here steeper than in the other case. In like manner, care should be taken to insure a thorough purification of the foul drainage waters by a system of surface or sub-surface irrigation, as heretofore indicated. It should also be remarked that a removal of the barns and the dwelling to another location, more distant from the reservoir is entirely practicable; and I infer that arrangements with Mr. Jansen for an amicable adjustment of the case can be readily effected.

In conclusion, I would mention that the substance of this report was communicated to the town board of health at a conference with a majority of its members on the afternoon and evening of the day of my inspection. Dr. Hardenburgh and Messrs. Allerton, Holbrook, Cox, Multhauer and Van Inwegen being present. As many of the important questions involved were of a purely legal nature, I advised the authorities to carefully verify the legal views to which I had ventured to give utterance before taking action, and then to submit the various steps ultimately decided upon to you for approval.

Respectfully submitted,

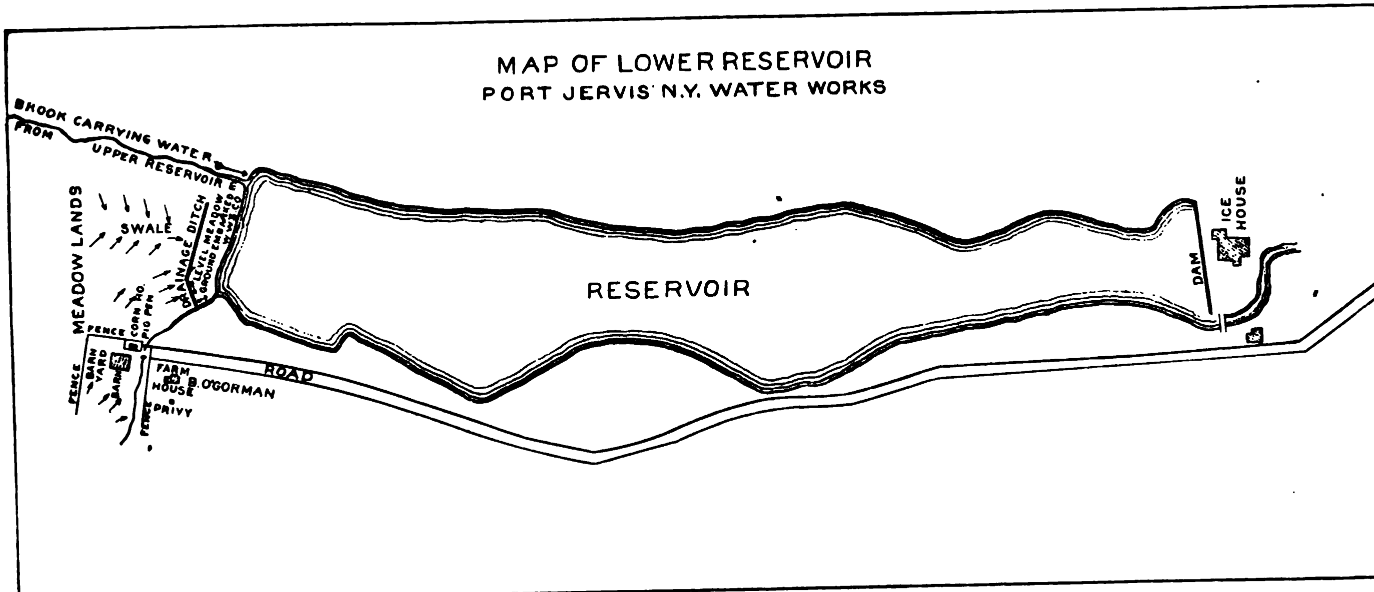
EMIL KUICHLING,

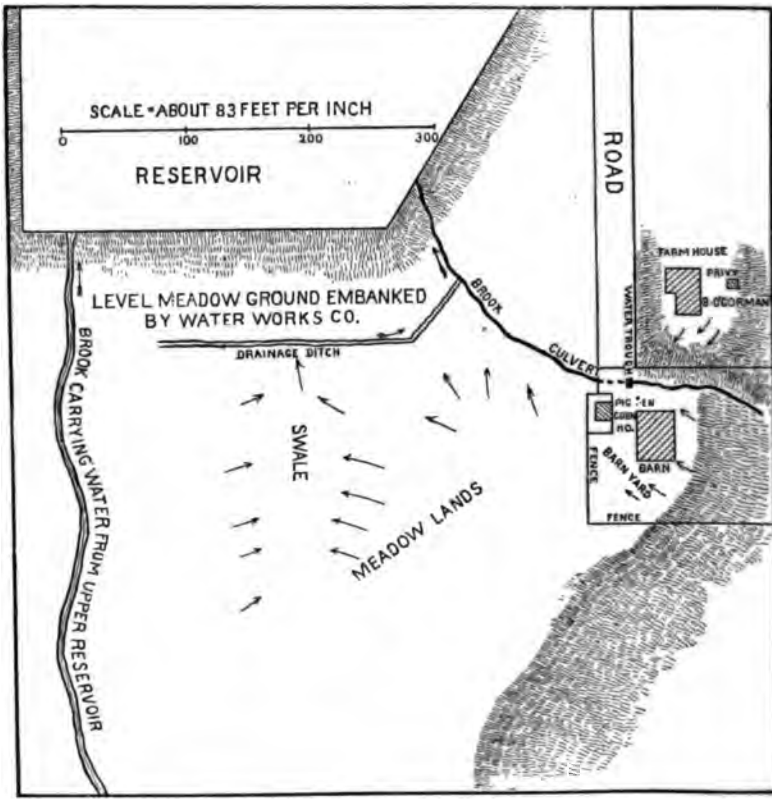
Civil Engineer.

The report was approved and a copy sent to the health authorities of Port Jervis for their guidance.

LEWIS BALCH,

Secretary.


MAP OF LOWER RESERVOIR
PORT JERVIS N.Y. WATER WORKS
BROOK CARRYING WATER FROM UPPER RESERVOIR
MEADOW LANDS
SWALE
DRAINAGE DITCH
LEVEL MEADOW GROUND EMBANKED W.W. CO.
CORN HO.
PIG PEN
FENCE
BARN YARD
BARN
FARM HOUSE
B. O'GORMAN
PRIVY
ROAD
RESERVOIR
DAM
ICE HOUSE


SCALE = ABOUT 83 FEET PER INCH
0
100
200
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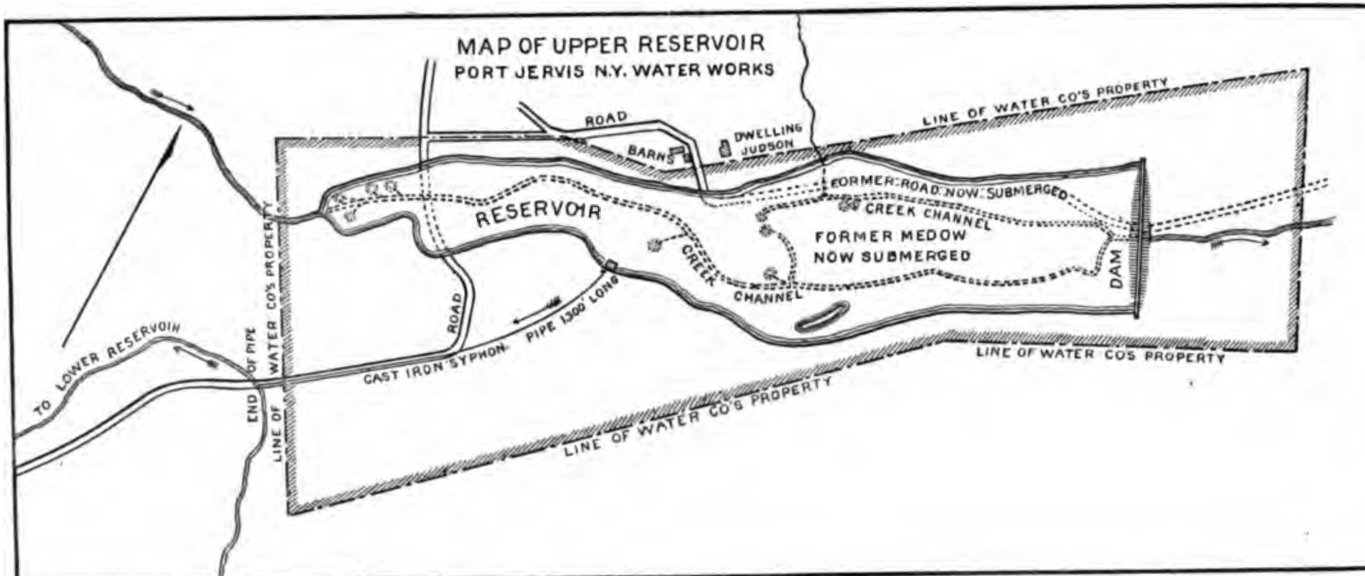
RESERVOIR
ROAD
LEVEL MEADOW GROUND EMBANKED
BY WATER WORKS CO.
DRAINAGE DITCH
BROOK
CULVERT
WATER TROUGH
FARM HOUSE
PRIVY
B. O'GORMAN
BARN
BARN YARD
FENCE
FENCE
SWALE
MEADOW LANDS
BROOK CARRYING WATER FROM UPPER RESERVOIR


MAP OF UPPER RESERVOIR
PORT JERVIS N.Y. WATER WORKS
ROAD
BARNS
DWELLING
JUDSON
LINE OF WATER CO'S PROPERTY
FORMER ROAD NOW SUBMERGED
CREEK CHANNEL
RESERVOIR
FORMER MEDOW
NOW SUBMERGED
CREEK
CHANNEL
DAM
ROAD
PIPE 1300' LONG
CAST IRON SYPHON
LINE OF WATER CO'S PROPERTY
TO LOWER RESERVOIR
END OF PIPE
LINE OF WATER CO'S PROPERTY
LINE OF WATER CO'S PROPERTY

REPORT OF VISIT TO PINE HILL, ULSTER COUNTY, N. Y.

ALBANY, *June* 12, 1886.

Having been requested by Health Officer Winter, Phoenicia, Ulster county, to investigate with him the sewerage of Pine Hill, and the pollution of the water supply of the Rip Van Winkle House in that village, complained of by Francis D. Buck, M. D., of New York, said complaint having been referred to the board of health of the town of Shandaken for their action, on Wednesday, June ninth, I took the 5:30 A. M. train of the West Shore Railroad to Kingston, N. Y., from there going to Pine Hill via the Delaware and Ulster Railroad, Dr. Winter meeting me at Phœnicia.

On arrival at Pine Hill I found the village to be placed in a valley, a small creek, the Esopus Creek, running through the village in a curved direction, and having several privies protruding over the creek where it was confined in walls. As the water in summer varies greatly in amount, at times covering the whole bed of the creek, and at others but a very small streamlet being present, it was found that in dry times the night-soil from these privies accumulated and created a nuisance.

On the road leading down from the main part of the village, two large boarding-houses were built, one the Guigon House, the other the Rip Van Winkle. Opposite these houses the stream ran in the meadow across the road, being some one to two hundred yards away.

The Guigon House was found to drain by a tile drain into the creek. The water of the creek was at this time some three or four feet away from and below the mouth of the drain. Six water-closets were said to empty into the drain. On the side of the stream, near the opening of the drain, old papers and refuse were lodged in the bushes, left there by the water when it was higher. It was stated the drain was flushed out by the wash water being thrown in during the summer, and the contents of the drain which might accumulate at its mouth, washed into the stream. It was also stated that this very wash, coming with some force, carried the sewage upon parts of the dry bed of the creek, and leaving it there created a nuisance.

At the Rip Van Winkle House the sewage was conducted into large cess-pools, which were air tight and from which no odor or trouble came. The plumbing of this house was mostly new and of excellent pattern. The water supply was taken from the overflow of a spring situated 200 feet above the level of the house, and 1,200 feet up the hillside. An iron pipe, protected by a screen, took the water from a sunken box, and carried it to a reservoir back of the house, from which it was carried by pipes to

the house. This supply pipe had a cut-off. The spring supplying this water was some 200 feet or more from the intake, situated on land not owned or controlled by the hotel. It consisted of three small springs, two coming up from a flat surface about 8 x 20 feet, at the bottom of a natural basin in the hillside, the third spring coming out of the bank at the head of the basin bottom. The surface of the basin was covered by loose stone, mostly flat, and no place was seen where accumulation of water was had sufficient for the watering of cattle. Cattle had tramped all about and over the spring basin, as could be seen by tracks where any mud was found, and by their dropping, which polluted the spring.

It was stated that the owner of the spring had been offered $150 for the piece of ground covered by the spring basin, so that the spring could be fenced and preserved from contamination. That he asked $300, had stated the spring was of no use to him for his cattle, they using another and larger one some little distance away, and that he would not allow the hotel people to clean and protect the spring. It was advised as follows:

First. The privies over the stream in the village to be removed and tight vaults constructed for them.

Second. That the Guigon House be directed to construct a cess-pool into which the tile drain could be turned and stopped from using the creek as an outlet for their sewage.

Third. That the owner of the spring be directed to clean it and preserve it free from pollution, it being held that while he had a right to use the water for his cattle or such other proper and legitimate use as he required, he owned the spring but to that extent, and its overflow, being used as potable water, and taken for such not on his land, or direct from the spring, but on land not owned or controlled by him, said land being watered by the natural overflow and streamlets coming from said spring, that he could not pollute, or permit his cattle to pollute a natural potable water supply.

Fourth. That all and several of the parties maintaining the nuisances quoted above, if they failed upon notice to abate the same, were liable to the penalties provided for in such cases of non-compliance with the orders of the board of health, and measures should be taken to compel their compliance.

Fifth. That the danger to the village was from the decaying of night soil left in the dry bed of the creek, and to the Rip Van Winkle house by pollution of its potable water.

From Pine Hill, in company with the health officer, I drove to Phœnicia. Arriving there inspected the Tremper House and found plumbing in good condition and appliances proper. The sewage was taken in a tile drain to the bed of the creek, about one-eighth of a mile distant. Here the flow of water was much greater than at Pine Hill, three other streams uniting above the outlet of the drain with the main water-course.

Also examined a house where trouble was complained of as coming from a cess-pool across the way. Found no drains but an open ditch in the cellar of the house, the wash from the upper portion coming by a small pipe into this ditch, and it being near to the well or water supply. In the next yard a well also said to be contaminated by the leakage from the cess-pool. Back of the railroad station two boarding-houses having privies projecting over the walled bank of the stream, with the stream water there distant from where the night soil deposited some twenty feet or more. A wooden box drain led from one of these houses through the wall, and the sewage therefrom fell a distance of three to four feet upon the dry bed of the creek below. It was advised as follows:

First. That the drain of the Tremper House be carried further into the bottom of the creek and protected by a stone covering.

Second. That the drain in cellar of house examined be made a proper tile drain, a larger pipe for carrying the wash be put in, and the whole be moved further from the well or cistern. That peppermint be emptied into the cess-pool, and water pumped from the well said to be contaminated by it, to see if leakage from the cess-pool did take place as claimed.

Third. That the privies over the stream bed be removed, and vaults built instead.

Fourth. That the wooden box drain be lowered and carried under the dry bed of the creek to such a point as its outlet would be under the water then flowing.

LEWIS BALCH,
Secretary.

MOUNT VERNON WATER SUPPLY.

November 22, 1886.

JARED SANFORD, Esq.,
President Board of Trustees, Mount Vernon, N. Y.:

SIR. — On November fourth, in company with Dr. Brush, health officer of the town of East Chester, Dr. Weiss, health officer of Mount Vernon and Mr. James T. Gardiner, consulting engineer to the State Board of Health, I made an inspection of the pumping station and reservoir of the New York and Mount Vernon Water Company, and also of the claimed sources of pollution of the reservoir and Hutchinson's creek.

Upon reading the report of the proceedings of your Board in regular meeting held Tuesday, October 19, 1886, comparing the various chemical analyses made by the several chemists employed, the reports of those examining the reservoir and its sources of supply, and taking into consideration the condition of the reservoir, stream and surroundings found on my visit on the fourth instant, I am of the opinion that the water as then found in the reservoir was not good potable water.

The sources of contamination are clearly set forth in Mr. Gardiner's report hereto annexed.

The water is by some pronounced wholesome. I cannot agree in this opinion. Although no one case of sickness may be at present traced directly to the water supplied from the reservoir, the condition of the water, the manifest sources of contamination are of such character as to be of serious menace. It is but proper, therefore, to take measures whereby this danger may be removed, before such action is forced by the presence of an epidemic of disease.

The following suggestions are respectfully submitted:

First. The reservoir to be cleaned of stumps, bushes and grasses, deepened and fenced.

Second. All privies, hen houses, barns, vaults, cesspools, duck ponds, fords, places where carriages or clothes are washed, to be so arranged for that contamination from these sources in the future will be removed.

Third. One main source of pollution being in the swamp known as "Drake's swamp," a channel should be cut through it, that the stream may not be spread out over such a large surface, and the stream given a more concentrated flow. This canal should be walled on its sides, and the swamp drained to prevent accumulations of stagnant water. Whether the lay of the land will permit of this improvement, cannot be determined without surveys.

Fourth. Another filter for the effluent from the New York Infant Asylum.

Fifth. To still further guard against impurities, to have the water from the reservoir filtered through readily cleansible filters, before it is distributed to the mains.

Sixth. To arrange two wire screens instead of one, at the intake crib in the reservoir, that they may be changed and cleaned.

I have the honor to remain, sir,

Yours truly,

LEWIS BALCH,

Secretary State Board of Health.

REPORT ON THE WATER SUPPLY OF THE VILLAGE OF MOUNT VERNON.

To LEWIS BALOH, M. D.,
Secretary State Board of Health, Albany, N. Y.:

SIR.— The public water supply of the village of Mount Vernon is pumped from a reservoir made by damming up Hutchinson's creek, a small but long stream which flows southward between the towns of East Chester, New Rochelle and Pelhamville.

The dam which forms the reservoir is perhaps 500 feet long, and from six to eight feet high. By means of it the water is set back up the valley of the creek perhaps 1,500 feet, forming a shallow reservoir.

At the time of my visit, November fourth, the water was about two feet below the spillway of the dam. In sounding to determine the approximate depths of the reservoir, I found the water in the lower third of the reservoir to average from four and one-half to five and one-half feet deep. Above this it shallowed rapidly until an average depth was found not to exceed one foot or eighteen inches.

It was difficult to get about in a boat in this part of the reservoir owing to the great number of stumps which were either above the surface or were within a few inches of it. In dragging between these I found a large amount of vegetation upon the bottom.

The valley, which now makes this shallow reservoir, had been flooded without removing from the surface of the ground either the stumps or the surface soil, which consisted largely of organic matter. Owing to the strictures made by the health officer of East Chester, as the superintendent informed me, they are now engaged in cleaning out the upper part of the reservoir with a view to removing all the surface organic material to a depth apparently of from one to two feet. Should this work be carried out and the water raised to the flow-line of the dam, the average depth of the upper third of the reservoir would probably be increased to a depth of from three to four feet, while the average depth of the remainder would, under the most favorable circumstances, be probably about six feet.

A clay stratum underlies the reservoir, which along its upper surface seems to carry a flow of spring water. Wherever this could be seen, however, the amount of spring water discharged is very small. I found no evidence that in quantity it would be one per cent of the water received into the reservoir from Hutchinson's creek, which enters at the upper end. I have no data by which to determine what the summer flow of this creek is. It is evidently very small, for the flow at the present time, which is probably at least fifty per cent greater than the summer flow, is not large.

The health officer of East Chester informed me that the reservoir was not full during summer.

Some 800 to 1,000 feet above the reservoir a small branch enters Hutchinson's creek from the west. Its sources are about a mile away in some large springs, at the New York Infant Asylum. Other springs enter this branch. About a little more than a mile above the reservoir the course of Hutchinson's creek lies through a swamp, where the water spreads out into shallow pools and is brought in contact with a large mass of growing or decaying vegetation. The swamp is from half a mile to three-quarters in length. There does not appear to be any springs in this swamp that add materially to the flow of the stream. The amount of water flowing in the channel above the swamp seemed to be approximately the same as that below it.

On the east side of the reservoir two houses are situated close to the bank. One of these is nearly on the declivity of the steep bank which rises at least twenty feet above the water. On this slope and about fifty feet from the water is a hen house, as foul as these places usually are, and a privy, the contents of which in a heavy rain may be washed down into the reservoir. A drain spout from the sink in the house empties into a partly broken barrel, which also stands near the top of the bank of the reservoir. In this the sink refuse and filthy water accumulate until the broken part of the barrel is reached, when the putrid mass overflows and descends by a well-marked channel into the reservoir. This overflow is likely also to occur whenever there is a heavy rain.

In the yard of this house which is above the top of the reservoir bank, and within fifteen feet of it is a pile of rotting garbage, the refuse of the house. There can be no question that at times the reservoir water would be polluted by the washings from above the chicken coop, privy, cesspool, barrel and garbage pile. Some 500 feet further north another house is situated, having a privy close to the top of the bank. While these premises are cleaner, there is yet here more than a possibility of pollution by the washing into the stream of human dejecta. Some 800 feet above the head of the reservoir a stable is situated, located close to the stream, and a place is prepared for washing carriages in the brook. There are probably also places where clothes are washed at times.

On the branch spoken of as heading at the New York Infant Asylum, there appear to be no sources of pollution until the filter beds of the Infant Asylum are reached by the course of the little brook. They are distant perhaps a mile from Hutchinson's creek.

These beds take the sewage of the New York Infant Asylum, where there is said to be some 400 inmates. The sewage is distributed by a system of porous subsoil drains about eighteen inches below the surface of the ground. Eight feet below the surface is a corresponding system of collecting drains, so that the sewage may be filtered through at least six feet of soil before reaching the collecting

drains. The amount of land included in these beds is so large, the soil so porous and the beds themselves so much higher than the lot immediately adjoining on the east that very little, if any, water appears to reach the deep collecting drains during dry weather. When the ground is saturated with rain, these deep collecting drains undoubtedly are discharging. When they discharge it is into the Infant Asylum branch of Hutchinson's creek, and the water reaches the reservoir after a run of about a mile.

Whenever the distributing drains are stopped the sewage backs up into a manhole which overflows into a deep ditch that also discharges into the Infant Asylum branch. The appearance of the bed of this ditch indicated that such overflows did occur.

The Infant Asylum branch is a stream hardly more than a foot wide by two or three inches deep. When the deep collecting drains of the filter beds are discharging, the water must, to a certain extent, pollute both the Infant Asylum branch and possibly the reservoir. The water from the sewage filtration beds while very much purer than crude sewage, is not considered a potable water. Without watching the working of these beds throughout the year it would be impossible to say how often the collecting drains discharge into the brook and what the amount of discharge is. Therefore it is not possible for me to give an opinion as to the extent of the pollution caused by the discharge of these filter beds. It is probably very small during the low water season of the year; but when stoppages occur or when the distributing tiles are taken up and washed as they are once a year, the pollution of the stream may become a very serious matter.

The amount of the danger in stoppages and overflow could only be estimated by knowing the number of stoppages during the year.

That the sewage filter beds of the New York Infant Asylum do at times, to some extent, pollute the waters of this branch of Hutchinson's creek there can be no doubt.

The Wartburg Orphan Asylum has been discharging crude sewage into a branch of Hutchinson's creek until the first week in September, when arrangements were completed and the sewage discharged into a large cesspool from which it percolates into the ground. After examining the locality I am of the opinion that from this cesspool there is little danger of polluting the water of the reservoir. Above where we went on the main stream of Hutchinson's creek three privies are said to be located near the main channel, and on a branch which enters from the west they are said to be discharging sewage at a point which we did not see.

Analyses of the water of the reservoir and of the water as delivered in the village have been made by at least four chemists. One of them by Prof. Lattimore, in accordance with instructions from the secretary of the State Board. All the annalyses I have seen show an excessive amount of putrescible nitrogenous matter in the supply, as indicated by the amounts of free and albuminoid ammonia.

The albuminoid ammonia in the samples analyzed by Prof. Lattimore, is 0.030, while in the samples analyzed by Prof. Doremus it is 0.0686.

Looked at from a purely chemical standpoint .015 parts in one hundred thousand is usually taken as the limit of safety in the albuminoid ammonia yielded by analyses. It is evident, therefore, that the amount of putrescible nitrogenous matter in these samples exceeds that in the best recognized standards of potable water from two to four times.

An inspection of the stream for the first two miles above the reservoir is sufficient to account for this large amount of organic matter. It is probably derived largely from a swamp a mile and a half above the reservoir or from others which lie still further up the stream. The defilement of the water by human sources must be exceedingly small in amount of organic matter as compared with the products of decay derived from the swamp.

When the brook is low and the growth and decay rapid in this swamp it must be looked upon as a serious source of pollution. Whatever evils may arise from such an extensive pollution of the stream with decaying organic matter, must be greatly enhanced by the retention of the water in the shallow reservoir where its temperature is liable to be raised and maintained at a high point during the great summer heat. Water charged as this is with the products of decay becomes especially objectionable when stored in a shallow reservoir and raised to a high temperature. Even at the present time the water in the reservoir is so turbid with organic matter that the bottom is hardly visible at a depth of two feet. It is probable that this condition of the water can be partially remedied by cutting a straight channel for the brook through the swamp and so draining the swamp as to prevent the collection of pools of stagnant water on the surface.

To determine this exactly would require special surveys and levels which are not at hand. The reservoir, of course, can be somewhat improved by deepening and by cleaning out the stumps and vegetation from its bottom, but at best it will be but a shallow basin.

All the sources of human pollution, those from privies, cess-pools, barn-yards, etc., can very easily be obviated by proper arrangements. With regard to the filtering beds of the asylum the problem is more difficult. It can only be solved I think by making arrangements for the refiltering of the effluent from the beds before discharging it into the stream. Surface washings from about stables and yards of the Infant Asylum are also carried into this little branch by ditches. That part of the flow which is impure could possibly be diverted into a basin and passed through a filter bed before discharging into the brook; but when all this should be done it is still doubtful to me whether the amount of organic matter during the low-water period of the stream can be

kept at such a point as to make this a safe potable supply without filtration. It is said that the village of New Rochelle intends also to build a dam across Hutchinson's creek, a few miles above the Mount Vernon reservoir for the purpose of obtaining their water supply from the same creek. This would greatly reduce the summer flow of Hutchinson's creek, for probably comparatively little of the water enters the stream between New Rochelle and Mount Vernon, and because New Rochelle would be likely to take a very large proportion if not the whole of the water that passes that point. It may easily be possible, therefore, that the amount of water flowing into the Mount Vernon reservoir may be so reduced that the supply could not be kept in sanitary condition even with filtration, for should the taking of the water by New Rochelle result in there being a mere trickle down the channel of Hutchinson's creek, the reservoir could certainly not be kept full and the growth and decay of organic matter in it might become so excessive as to cause disease in those drinking the water. It is impossible to know exactly what action to recommend to the water company and the sanitary authorities until this question of the amount of water which is to be received into the reservoir during the summer is determined, and this will depend both upon the natural summer flow of Hutchinson's creek and upon the amount abstracted from it by New Rochelle or other towns lying above Mount Vernon.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

REPORT ON THE INSANITARY CONDITION OF CANISTEO.

To the Health Officer of the Village of Canisteo:

SIR. — Your village board of health being convinced by the occurrence during the past year of a very large number of cases of typhoid fever and diphtheria, that certain conditions generally detrimental to the public health must exist in the village, were desirous of securing an investigation into the causes of the prevailing diseases by the State Board of Health. The Secretary of the State Board of Health appointed me to make the investigation.

I visited Canisteo on September sixteenth, and in company with your Board made a complete examination of the village, and now have the honor to report to you my observations and conclusions.

TOPOGRAPHY AND GEOLOGY.

The village of Canisteo, situated on the Erie railroad a few miles east of Hornellsville, lies at the foot of the steep hills on the south side of the valley and extends half way across the valley itself. This valley of the Canisteo is an alluvial plain about half a mile wide sloping gently towards the river, which at Canisteo flows close to the foot of the hills that rise on the north side of the valley. The river has very little fall at this part of its course, but some three-quarters of a mile below the railroad station there is a riffle with a descent of from three to four feet. The river is perhaps from fifty to sixty feet broad with a depth of from two to three feet. The banks are from five to eight feet high, and from them the land rises southward toward the village.

Main street lies one half a mile south of the river and is approximately parallel with it. The greater part of the dwellings lie still further south between Main street and the foot of the hills. A lateral valley, the valley of Bennet creek, debouches into the valley of the Canisteo at the village, and one of the principal streets of the village, Greenwood street, runs south-west directly up this valley. Bennet creek itself lies to the east of Greenwood street, and between the two a large population is settled.

At the junction of Main and Greenwood streets, which may be considered the center of Canisteo, half a mile distant from the river the surface is about sixteen feet above the water level. This elevation is maintained along East Main street for probably half a mile. To the westward, however, the ground falls so that at Taylor street, which is nearly parallel with Greenwood, the elevation of the surface is hardly ten feet above the water in the river.

From Main street southward, up Greenwood, there is first a slight ascent and then an increasing rise, so that by the time the tanneries are reached the valley must be not less than twenty-five

feet above the low-water surface of the river. These elevations may be considered as only approximate. They were taken to answer sanitary purposes not engineering.

This brief description shows that the southern part of Canisteo is situated in the valley of Bennet creek, and that the main part of the place lies just in the mouth of this valley as it opens into the valley of the Canisteo. The fact is important as bearing upon the sanitary condition of the place.

The soil throughout the greater part of the village is of a clayey loam, varying from four to eight feet deep, underlaid by some six feet of coarse gravel, beneath which there are some six feet of clay underlaid by a second stratum of gravel. The subsoil water, through at least three-fourths of the village, rises to the top of the upper gravel stratum even in time of drought like the present. In wet weather the subsoil water rises into the clayey loam overlying the gravel, and in many places causes damp and wet cellars. In general, it has been found necessary that the greater part of the village should put the bottoms of the cellars only three or four feet below the average level of the surrounding surface. I found that the floor of the cellar in the house of the health officer was only one foot below the low grounds, within 100 feet of his house.

The principal current of the subsoil water is from the valley of Bennet creek northward towards the river. This water undoubtedly is spring water coming from Bennet creek and its lateral valleys, as well as from the hills above the village.

WATER SUPPLY.

In former times most of the people were supplied with wells dug down through either the upper or lower gravel stratum, so that many holes were opened through the clay that divides these two strata. Latterly driven-wells have come into use and these are driven, some into the upper gravel and some into the lower.

The drinking water in common use in the village is therefore water from either the upper or lower stratum of gravel which underlies the town, and is usually drawn from these gravels by driven-wells. It must, however, be borne in mind that the water from these two gravel strata is not absolutely distinct, but that connection has been made between the two wherever the dividing clay has been cut by one of the old dug wells as well as by any natural channel which may exist through the clay.

SEWAGE DISPOSAL.

The sewage of the village consisting of human excreta, slop water and filthy wastes of all kinds that come from human dwellings is disposed of in the soil. It is the habit of the village to dig the privy pits down to the upper gravel, so that the ground water stands in many of them and dissolves and carries away their

contents. The same method of disposal is practiced with slop water and other filthy liquid wastes from dwellings. They are thrown into cesspools dug so deep that their contents leach away into the upper gravel stratum and are dissolved into the ground water.

BURIAL OF THE DEAD.

The cemetery is situated on the western slope of the valley of Bennet creek, perhaps a thousand feet west of Greenwood street and twenty to fifty feet above it. The village, between the foot of the hill and Bennet creek opposite the cemetery is thickly settled. The subsoil waters from the cemetery flow southward into the gravel underlying Bennet creek and thence northward under the whole village. In the flat opposite the cemetery and within a thousand feet of it the subsoil water rises so near the surface of the ground that some of the cellars, although very shallow, are damp or muddy throughout a large part of the year.

PREVAILING DISEASES.

The following is the official report of the health officer of deaths from September 1, 1885, to September 1, 1886, the total being forty-three:

Typhoid fever	8	Apoplexy and paralysis	3
Diphtheria	8	Meningitis	2
Consumption	3	Old age	3
Pneumonia	2	Dysentery	1
Peritonitis	3	Blood poisoning	1
Bright's disease	3	Valvular disease of heart	1
Cancer	2	Infants diseases	3

The proportion of deaths from typhoid fever and diphtheria is enormous as compared with the average of the State. The typhoid deaths were at the rate of 190 out of 1,000 deaths from all causes, while according to the report of the State Board of Health the deaths from typhoid fever throughout the State did not exceed thirteen per 1,000 deaths from all causes. In other words there were fourteen times as many deaths from typhoid fever as there should be, even if we hold up no higher standard than that of the average sanitary condition of the State.

As regards diphtheria the deaths were also at the rate of 190 per 1,000 deaths from all causes, while the average of the State is about fifty. This shows that the death-rate from diphtheria in Canisteo is three and one-half times greater than that of the average of the State. The death rate from consumption is also excessive. One of the marked effects in the distribution of the filth diseases in Canisteo is that the cases are most numerous where the subsoil water rises nearest to the surface of the ground. In the locality where the greatest number of cases now exist the ground

water is only from eighteen inches to two feet below the surface. From the report of the health officer it appears that there have been from thirty to forty cases of typhoid fever in Canisteo during the past year; that nine new cases have occurred during the past few months; that there have been over 100 cases of diphtheria during the year and new cases are constantly occurring; that dysentery and diarrhœa are common; that consumption is prevalent, and that a very large proportion of the population are afflicted with catarrhal difficulties. The population of the village of Canisteo is about 2,500. That such a number of cases of typhoid fever and diphtheria should occur in one year is of itself sufficient evidence that filth poisoning is prevalent. In the case of diphtheria it is probable that many of the cases are due to contagion, but others have occurred under circumstances which point to its having originated on the premises. One of the first cases of diphtheria was in the same house where typhoid fever had occurred the previous year. This recurrence of different forms of filth disease in the same locality points to a common cause for both the diphtheria and the typhoid.

I carefully inspected the premises in different parts of the village where these diseases had occurred. In very few of them could I detect any insanitary condition especially characteristic of these premises. Cases of typhoid and diphtheria occurred from the most southerly part of the village in Bennet creek valley throughout the place. The greatest number of cases, however, appeared to be between Greenwood and Taylor streets, where I found the subsoil water, even now in this time of drought, within eighteen inches to two feet of the surface of the ground.

I visited one case of typhoid fever where the dejecta of the atient is being thrown into the privy without disinfection. I amined the vault and found the water standing within eighteen hes of the surface of the ground. Within a few hundred feet this house and about in the direction the subsoil water flows, is iallow pond in which the water stands at the same level as in privy. Both the privy vault and the pond reach the upper vel stratum, so that there is free connection between the typhoid-soned vault and the pond. In fact, the typhoid-poisoned water n the privy vault of this part of the village flows northward er many other dwellings and cellars.

here typhoid and diphtheria poison is thrown into the subsoil r in the upper part of Greenwood street, this polluted water northward under the whole village. The wide-spread occur- of the cases shows that some common cause is acting through illage to produce filth disease of various forms. It is now n that typhoid fever is caused by a micro-organism which in great quantities in the dejecta of the typhoid patient. nicro-organism can live in water and probably has the power rmous self-multiplication in polluted waters under favoring

conditions. It does not seem to require a high temperature for its propagation.

While the actual cause of diphtheria is not so well known, it is nevertheless probably also a micro-organism, and like the other microbes is doubtless endowed with such powers of reproduction that myriads may be brought into existence in a few hours under favorable conditions. When the proper soil is present for the development of these disease producing germs and the seed is once planted in it, the crop is sure to follow and be more or less abundant depending upon favoring conditions.

A grossly polluted sheet of ground water is flowing under Canisteo only a few feet below the surface and at times rises into or near the bottoms of the cellars. In this water have been planted the fatal seeds of diphtheria and typhoid fever which have been disseminated under the whole village. The crop which follows as sure as the harvest follows seed time is growing beneath the houses of the people. Its fatal seeds reach them doubtless in two ways; first, through the water from the wells. As I have shown there is no security in the water from the lower stratum of gravel, since the two gravel strata are connected in many places by old wells that have cut the intervening clay. All of the water that underlies the village is therefore liable to be impregnated with the germs of typhoid fever, diphtheria, dysentery or any other of the filth diseases whose germs flourish in water. Secondly, the germs of disease reach the air of the houses through the cellars. The interstices in the soil under the dwellings is filled with air. Even the upper six feet of the soil of Canisteo probably contains twenty per cent of its bulk in air. This air is in contact with the filthy moisture of the subsoil. In places the moisture itself rises by capilarity through the floors of the cellars. Every heated house forms a chimney which like a flue sucks the air from the soil. Heated houses form as it were ventilators for the soil, and the ground air is drawn up through every story of the dwelling. If the cellar air is polluted the air of the whole dwelling will be contaminated. By this means the polluted soil of Canisteo sends its disease germs up into the houses of the people, and any susceptible person is liable to be attacked by them. Of course when the subsoil water rises in the winter and spring the air in the soil is expelled into the dwellings of the village through the cellars. When the surface of the ground is frozen and the houses are warm the current of air from the soil into the dwellings is much stronger than at other times.

After carefully considering all the facts of the case I think there can be no reasonable doubt that the subsoil water and the ground air of Canisteo are not only polluted with filth, but that the specific germs of disease have been planted and are flourishing therein.

REMEDIES.

The permanent and complete remedy for this evil is two-fold:

1. To secure an ample public supply of pure and wholesome water from some source not liable to contamination and to insure that this water shall be of such quality that it will be acceptable for use to all the citizens. When such a supply is provided and sufficient time given for its general adoption after due notice, every well in the place should be closed by order of the board of health.

2. The pollution of the soil and subsoil water must be stopped; otherwise the ground air will continue to be poisoned. This can only be accomplished by providing means for the disposal of the filth through sewers.

A brief reconnaisance showed me that sewerage was possible for your village although the case is not a simple one. An outlet for the sewage could be found into the Canisteo river, the sewage being so treated before delivery into the stream that no nuisance would be created. Unless a pure and abundant supply of water is provided for Canisteo, and sewers to carry off the filthy wastes of the town I see no prospect for securing the healthfulness of the village.

In the meantime no water should be drunk that has not been boiled. This will, however, prove but a partial safeguard. No one can say how often disease germs are reaching people through the water or how often through the air. In the winter it is probable that the polluted air is almost as important a factor as the water. While, therefore, the drinking of the water which has been boiled may act as a partial safegnard, there are no permanent remedies for the grossly insanitary condition of Canisteo, except a pure public water supply and properly constructed sewers. I took no samples of ground water for analysis because I did not consider that chemical analysis would throw any additional light upon this case. The micro-organisms which cause the prevailing diseases cannot be detected by chemistry nor will chemical analysis determine whether the conditions exist for the development of these pathogenic germs.

Very respectfully,

JAMES T. GARDINER,

Consulting Engineer.

REPORT ON THE CAUSES OF TYPHOID FEVER IN THE VILLAGE OF CAMDEN.

To the Board of Health of the Town of Camden:

The village of Camden is situated on Fish creek some seventeen to eighteen miles north-west of Rome. Fish creek is a large stream with a heavy fall between its head-waters and Rome. At Camden, near the lower end of the village, the stream is dammed and the water set back some half a mile. The mill pond opposite the central part of the village, is three or four hundred feet broad. The main current and deep water in the pond is along the eastern shore. The greater part of the village is situated on this side of the creek. The western half or three-quarters of the pond has been slowly filled with accumulations of sawdust and shavings from the mills further up the stream until it is now a marsh, rather than a pond, throughout at least one-half of the year. A luxuriant growth of aquatic plants flourishes in the rich soil made by the decomposed sawdust. So long as the water is high enough to run over the dam from three inches to a foot of water covers these swampy shallows. When the water falls as it usually does about the first of August, the shallows are laid bare, and many of the acquatic plants die and rapidly decay; while active fermentation or putrefaction takes place in the deposits of moist sawdust exposed to the intense heat of August.

Close to the western bank of the pond is a knitting mill where some eighty people are employed. Wool washing and analine dying processes are carried on at this mill, and the liquid wastes are drained into the pond. Along the eastern side of the pond are three or four privies near enough to its borders for the contents to be washed into the water, and at the extreme upper end of the pond a slaughter-house stands on the bank.

The pond is used for cutting an ice supply in the winter, although the ice is principally cut above the knitting mill and the marshy flats opposite to it. The waters of this pond are polluted from several sources: 1st. From the washings from a few privies. This source of pollution is very slight as compared with the others; but it nevertheless furnishes an element of danger as do the wastes from the slaughter-house which enter at the head of the pond. 2d. The waste from the knitting mill pollutes the pond, both by the water which comes from the washing of the wool, extremely foul, and also from the analine dyes. These liquid wastes generally flow out over the shallows of the western side of the pond and slowly work their way down the stream; but when the pond has been drained down during low water, either in winter or in summer, and is being refilled, back water occurs, and the wastes from the knitting mill may be carried some distance up the pond, probably not infrequently to the very locality where the ice supply is

cut for the village. The third source of pollution of the pond is the immense amount of sawdust and shingle shavings which come down from the mills above. The principal supply of this material appears to be from a mill about a mile above the dam. The accumulation of sawdust and shavings have, as I have said, filled all the western part of the pond, so as to convert it practically into a marsh. The decay of this material in such large quantities furnishes a large amount of polluting matter.

The village of Camden lies principally to the east of the pond on a plateau of porous soil in which the ground water is from twenty to twenty-two feet below the surface of the ground. The village has a population of about eighteen hundred. The general health of the village throughout most of the year is excellent; but for the past three years, when the water falls in the pond there have suddenly developed a number of cases of enteric trouble, among them a large percentage of distinctly marked typhoid cases.

In examining the records of death in the village I found that from October 1, 1885 to April 2, 1886, there were but ten deaths, and of these, only two could be considered as from zymotic diseases; one was typhoid and the other cerebro-spinal meningitis. But from April second to September twentieth there were nineteen deaths, eight of which were from zymotic causes.

In the ten months between October 1, 1885 and August 1, 1886, there was but one death from enteric trouble; but in the next six weeks seven occurred, three of which were from distinctly marked typhoid fever. All of the three deaths from typhoid were of persons in some way connected with the pond. Two worked in the knitting mill and one was in the habit of boating on the pond.

I examined carefully the dwellings of these people and could find nothing insanitary about their homes, which were at a distance from the water.

Of the non-fatal cases, Dr. Leonard, the health officer, reports four typhoid and three remittent fevers. Of these four non-fatal cases of typhoid, two worked in the mill and one boated on the pond. I can learn of but eight fatal and non-fatal cases of typhoid during the past year. Seven of these have occurred since August first, and six of them in persons connected with the pond. One of the other cases came, in every probability, from drinking from a polluted well, the well being situated within thirty feet of a large privy vault which was filled to overflowing.

Of the remittent fever cases, one worked in the knitting mill. A careful analysis of the fact showed that Camden is very free from typhoid fever except among that part of the population which is connected with the pond either by working on its banks or by boating on its waters. The first case of typhoid began August sixth. The water had been so high as to constantly submerge the sawdust shallows until August first, when the water fell and the shallows were exposed.

It will be noticed that of the six cases of typhoid occurring in

connection with the pond, four worked in the knitting mill and two boated on the water in the evening. I requested the health officer to inform me whether during the low-water period deaths had occurred in previous years from enteric trouble. He answered that there were eleven in 1884 and nine in 1885 from enteric difficulties.

The evidence seems unusually conclusive that the germs of typhoid fever are planted and growing in the sawdust shallows of the mill-pond. This crop having been planted and the conditions having proved favorable for its development you are sure to have a yearly harvest of more or less distinctly marked typhoid fever until the source of the difficulty is removed.

REMEDIES.

Two things are necessary to remedy the evil: *First.* The filling of the pond with sawdust and shingle shavings must be stopped. The present condition of the pond is undoubtedly a nuisance detrimental to health and dangerous to life. The coming down of the sawdust and shavings is the primary cause of the nuisance. So far as the mills which produce this material are within the jurisdiction of your board, they should be compelled by your order to cease from polluting the stream and should be prevented from throwing any of their wastes into it. Such action is clearly within your power and is manifestly your duty. *Secondly.* The pond in its present condition having proved a dangerous nuisance this condition must be removed. The shallows must be dredged out so that at least two feet of water may be maintained over the bottom during the summer.

The dredging of these shallows would be an expensive undertaking. It is probable that they could be scoured out during the winter and spring floods by building a wing-dam to turn the main current of the stream from the eastern side of the pond to the western. The current of Fish creek is very powerful in times of flood, and could probably be so managed as to be made to scour out the shallows and deepen the water to a safe depth.

FURTHER MEASURES.

As the pond is to be used for obtaining an ice supply for the village, I should recommend that its waters be kept unpolluted; that no privies be allowed within fifty feet of its banks and that they should have tight boxes beneath the seats instead of vaults These can be constantly removed and cleansed. The refuse from the slaughter-house should be prevented from entering the pond and a four-inch vitrified tile drain should be laid from the knitting mill to a point below the dam where it can with greater safety discharge the liquid wastes of the manufactory.

ALBANY, *September* 30, 1886.

Very respectfully,

JAMES T. GARDINER,
Sanitary Engineer.

COMMUNICATION FROM BOARD OF HEALTH RELATIVE TO THE CONDITION OF THE NEW AQUEDUCT, NEW YORK.

In accordance with the following resolution of the Senate, received April 1, 1886:

STATE OF NEW YORK:

IN SENATE,
ALBANY, *March* 11, 1886.

Resolved, That the State Board of Health be directed to investigate the industrial and sanitary condition affecting the lives and health of the laborers and residents living along the line of the new aqueduct, and to report to the Senate, for the purposes of this committee, as early as possible, the results of their examination, and such measures as in their judgment are necessary to remedy any sanitary evils found to exist.

By order,
JOHN W. VROOMAN,
Clerk.

The secretary and consulting engineer, by direction of the executive committee of the Board, proceeded to inspect the new aqueduct, and respectfully submit the following report of their work:

Saturday, April third, the consulting engineer went to New York, visited the office of the chief engineer in charge of the aqueduct, Mr. S. B. Church, and examined the engineering plans, methods used, and progress of the work.

On Tuesday, April fifth, the secretary and consulting engineer examined at the chief engineer's office, Mr. Church, and eight others, who were inspecting, division and assistant engineers of the aqueduct, as to the ventilating and lighting of the various tunnels, methods of working, appliances at shafts, quarters of the men, character of the men, food supplied, manner of obtaining drinking water, arrangement of sinks, disposal of sewage, etc. They also examined the record of accidents along the line of work, resulting in wounding or killing, and the findings of the coroner's juries where such were reported.

Wednesday, April seventh, the secretary and consulting engineer went to Tarrytown to inspect parts of the aqueduct said by the engineers to be a fair sample of all the work. To inspect the whole line would have taken more time than was considered allowable under the resolution of the Senate, as the work begins at Croton dam and runs from there to One Hundred and Thirty-fifth street, New York city, a distance of thirty-one miles. All of this with the exception of about one and a quarter miles, is under ground, at

some places 500 feet below the surface, at others much less, while the one and a quarter miles is open cut. The tunnel itself is cut through the solid rock, is about the size of a single track railroad tunnel, and in its course passes about 100 feet beneath the bed of the Harlem river. The work is carried on by means of twenty-four shafts, about one mile apart, from which "headings" are pushed in both directions. About 4,200 men are employed on the work, and are divided between the various shafts, about 200 being at each. The tunnel is the longest of its size in the world.

In company with Mr. Kalmbach, inspector of mining appliances and ventilation for the northern part of the line, shafts 9, 10, 11 A, 12 B, 17 and 18, were visited. These cover a distance of about ten miles of the work, lying between Tarrytown and Yonkers.

The quarters of the men, mess-halls, kitchens, sinks, water supply, etc., were inspected at shafts 9, 10, 11 A. Shaft 3 was also inspected by the secretary on Sunday, April eleventh, and the quarters of all employees looked at. No special report need be made of this shaft, as it did not differ from others visited.

For fuller particulars of the work done, attention is respectfully called to the detailed report hereto appended.

In general it may be said that in shafts 3, 9, 10, 11 B, the ventilation was poor, and lighting was done by oil, gasoline or candles.

In shafts 12 B, 17 and 18, better ventilation was had and better lighting, electricity being used.

The quarters built by the contractors along the line were good and adequate. The mess-halls and kitchens clean, food plenty, of good quality, and well cooked and served. The quarters erected for the negroes, Hungarians and Italians were not so good, the latter being generally filthy. Sinks were usually found arranged some short distance from the quarters, but many of the men would not always use them. Care was exercised to keep the drinking water free from contamination.

Acting under the Senate resolution, we would respectfully recommend the following as best calculated to remove existing evils of want of ventilation, lighting, insanitary conditions of tunnels and quarters, and to better provide against loss of life or injury from accidents:

1. That all ventilation of the tunnels should be continuous, not intermittent.

2. That all tunnels be so ventilated that not less than 3,000 cubic feet of pure air per minute be supplied to each heading, the ventilating appliances to be so arranged that all foul gases, smoke, etc., be removed from tne tunnels.

3. That lighting by electricity be substituted for lighting by gasoline lamps, torches, etc.

4. That proper arrangements be made for the removal of human excreta from the tunnels, covered boxes, or some such article being used.

5. That authority be given some one at each shaft to be a deputy sheriff, to serve without pay or claim upon the county, and for it to be his duty to see that proper cleanliness of quarters be had, proper sinks made, and general sanitation observed around the shaft.

6. Under the clause in the specifications of the contracts for the work, relating to the safety of the methods employed and calling for all modern improvements in prosecuting the work, it is recommended that weekly, and as much oftener as necessary, reports be made in writing by the inspecting engineers to the chief engineer, as to the ventilation of the tunnels, the safety of methods of work used, the safety of the hoisting apparatus, and any other points affecting the lives and health of employes, and that the chief engineer, upon the receipt of such reports, call the attention of the contractors thereto, suggesting at the same time the remedy. And unless said evils are properly remedied by the contractors, the chief engineer may, upon personal inspection of the alleged improper appliances, have the power, if in his judgment the neglect warrants the same, to suspend work in such tunnel as may be the subject of the report, until such time as said evils are removed.

All of which is respectfully submitted.

LEWIS BALCH,
Secretary.

JAMES T. GARDINER,
Consulting Engineer.

Approved :

ERASTUS BROOKS,
Chairman Executive Committee.

REPORT IN DETAIL OF INSPECTION OF NEW AQUEDUCT BY LEWIS BALCH, M. D., SECRETARY AND EXECUTIVE OFFICER, STATE BOARD OF HEALTH, AND JAMES T. GARDINER, CONSULTING ENGINEER.

1. *Quarters, Mess-halls, Kitchens, Sinks, etc.*

A large portion of the men live in quarters furnished by the contractors, and rented to boarding-house keepers, of various nationalities. Some board in neighboring farm-houses. The quarters of the negroes, Italians, and Hungarians are built by an independent store-keeper at each shaft, who rents the lodgings and sells the provisions. They are not under the control of the contractors.

The quarters built by the contractors for the Americans and Irish are the best. Generally of two stories, holding about fifty men, with a room in the center of each, having a stove, and used as a sitting-room, on either side the sleeping quarters being compartments capable of holding two bunks, one over the other, with a gate-like door with lock and key.

These quarters were all fairly clean, well lighted and enough air drifting in between cracks to prevent them breeding disease. The buildings were of boards, battened, and partially lined with building paper. Those living in these quarters boarded at the mess-halls which were one-story buildings of the same class, the kitchen at one end and the tables arranged in two or three lines. Chinese cooks are employed. The halls, tables, tableware and kitchens were clean and in good order. The food was excellent in quality, enough in quantity, and properly cooked. No fault could be found in this division of the work.

The negro laborers lodge and board themselves. They have shanties, built generally of one story; construction of same general character but with kitchen in the rear; the sitting-room being next to the kitchen, and between that and the sleeping-rooms. These quarters were not as cleanly kept as the first described, nor was the kitchen and table service as clean. The food was abundant, of good quality, but neither so well cooked nor served.

The Italians and Hungarians also board and lodge themselves. Their shanties, built of the same material (battened boarding), are generally of one story, divided into smaller rooms, each of which contains a stove and around the sides two rows of bunks, one on top of the other, capable of holding two in a bunk, and the bunks sometimes boarded around, leaving but a small hole at the foot through which the occupants crawl. The floor space is very limited, and as all the cooking is done for the inmates in the same room the places are filthy. Fortunately the walls are not tight, and air comes in more or less, rendering the danger from this overcrowding not so great as if the tenement was of brick. There are probably not more than a hundred men occupying their quarters at any shaft.

At most of the shafts sinks are placed at a short distance from the quarters. At some, however, the men stray off as fancy leads them and create a constant nuisance in this way. This is especially the case with the Italians. To guard against this, authority should be granted to some one at each shaft, who should compel boarding-house keepers to provide suitable sinks, see that they are used, and that new ones are dug as the old ones fill up.

General supervision of police duty should be placed under the same officer, and at least once a week all the quarters should be thoroughly cleaned. This would entail no extra expense upon the contractors, as their store-keeper or time-keeper at a shaft could be the officer deputized to enforce these sanitary regulations, and boarding house keepers would conform to such regulations, as they receive the privilege of keeping the houses from the contractors.

The water supply is good. Care is exercised to keep it free from contamination, as all about the shaft generally obtain water from the same place, consequently any defilement of the wells or streams would be rapidly remedied by the contractors' store-keeper, or some other person of like standing at the shaft.

The advantage to the contractors of having the men healthy and quarters sanitary is that disease is kept away from the line of work. If a contagious disease became epidemic at any of the shafts, it would be not only more difficult to control with insanitary quarters, making good feeding ground for disease germs, but it would take much longer, and result in stopping all work upon the shaft, with probably total destruction of many of the buildings.

While a large number of men are employed on the whole work, the average number of men at any one shaft is seldom over 200; consequently the danger which would be present if the whole force was congregated in one place is avoided, while the work of keeping the line healthy is rendered much simpler.

2. *Health of Men as Affected by the Conditions in the Tunnels.*

The dampness present does not seem to be a cause of much sickness. Some cases of pneumonia have been reported which may have been caused from the dampness, or may be from other sources. Necessarily much of the dampness cannot be remedied, and therefore may be thrown out as a factor bearing on the health of the men.

The character of the air those employed in the tunnel have to breathe is a very important consideration. This is vitiated from various causes, many of which may be remedied and the health of the workmen conserved thereby. To easily understand the subject it may be best subdivided as follows:

1. Gases, poisonous in character.
2. Smoke from lamps, torches, candles, etc.
3. Excreta.

In each tunnel, on an average, forty men and two mules are employed. The ordinary allowance for fresh air in common dwellings per person is about 300 cubic feet of air space, and more is allowed for animals. This, with ordinary ventilation, keeps the air healthy. The exhalations from men and animals are largely composed of carbonic acid gas, combined with other impurities, making a gas noxious to life, consequently measures are taken to supply fresh air where people congregate, as the more rapid exhalation from numbers requires a constant supply to keep the air inspired capable of supporting life. The action of carbonic acid gas is narcotic, and an excess causes asphyxia. Forty men and two mules, estimating each mule at double a man, would exhale per hour 35.47 cubic feet of carbonic acid gas alone, besides all other exhalations of organic matter. This amount would defile of ordinary air 177,350 cubic feet per hour, rendering the air heavy, causing it to smell, and affecting more or less the blood supply of the brain. If we add to this the large amount of carbonic acid gas thrown out at each blast, and when the powder burns slowly, nitrous oxide gas, highly poisonous, it will be readily seen that

men are liable to be asphyxiated, or as is well termed on the work, "knocked out," by poisonous gases. Many men have been "knocked out," how many could not be ascertained, no records being kept, and varying lengths of time have been needed to restore them to consciousness. Some of the danger from the gas caused by explosion cannot be entirely guarded against, as the gas being heavy it falls with the "muck" or debris of the blast, and lies there, to be suddenly discharged in the face of the first one moving the rock. If the air around be foul and heavy, the man uncovering an excess of gas may be instantly overcome, but if the surrounding air is in motion, and fresh air constantly entering, the sudden eruption of an appreciable and poisonous amount of carbonic acid gas would be more rapidly diffused, reducing the danger to the minimum, or removing it altogether. This is one factor alone in rendering impure the air in the tunnels.

We next come to the methods of lighting as affecting the air and the health of the men in the tunnels. Where gasoline lamps, miners' lamps and candles are relied upon to furnish light, the smoke was found heavy, obscuring the view, so much so that, combined with the mists in the tunnels, a light could not be seen in some places 200 feet away. Not only do these lights rapidly use up the oxygen, but they diffuse a smoke containing carbon and the products of combustion held in suspension, so much so that the sputa is colored black, and all the air passages are charged more or less. While not markedly dangerous, *per se*, this carbon does no good to the lungs, and long continued may become a source of trouble in impeding the free passage of air in and out of their finer tubes and cells. The great danger is from the consumption of oxygen, the forming of carbonic acid gas, and in a lesser degree the dimness of the light, for as the air loses oxygen and gains carbonic acid gas the lights burn dimmer, conducing to accidents.

The third factor in vitiating the tunnel air is the excreta of men and animals. The principal products given off by these are chlorine, sulphureted hydrogen, ammonia and organic nitrogen. With the excreta of the animals but little, if anything, can be done, but the defilement coming from that of human beings can be prevented. It is a rule that all men must go to the surface to tend to their wants, but in a poorly-lighted tunnel it is much easier to blow out their candle and save themselves the trouble of ascending the shaft.

Taking all these factors together, it is readily seen that the tunnel air becomes injurious to breathe, for poor air debilitates the system, and where lived in for a long time increases the liability to lung affections. Where natural ventilation is relied on, aided by what air the drills at the headings may throw out, at no time can the air be proper for the men to breathe, they adding continually on the wrong side of the balance between good and bad. In the tunnel of shaft 12 B, where the lighting was by electricity, but few miners'

lamps being used only at the headings, and the iron ventilating pipe carried near the roof of the tunnel, fitted with blowers to draw the foul air out, the tunnel was clear, no sense of oppression was felt, and the men working at the brick lining were as comfortable, as far as respiration was concerned, as they would have been on the surface. No blasts had been made in this tunnel the day of inspection, but even when working full tide, the engineer stated it was always in good condition, free from smoke, and the air comfortable. The cause is easy to find, the tunnel was lighted by electricity; and the electricity not only does not use oxygen but generates it, creates no smoke, consequently the floating carbon is reduced to the minimum, and when the blowers are in operation this is rapidly drawn out in the current. The only adverse criticism that could be made here is the intermittent action of the ventilating apparatus. The ventilating boxes found at shafts 3, 9, 10 and 11 A are sufficient in size to give proper ventilation, if adequate means to ventilate are adopted; but even then it would be advisable that electricity be substituted for the gasoline, torches, etc.

To prevent defilement from human excreta, covered boxes should be provided, the men compelled to use them, and these when full carried to the surface, their contents emptied into pits and covered with earth.

3. *Character and Safety of Appliances for Working Shafts.*

More than a million tons of rock have been hoisted out of the shafts and a much greater amount remains. At some of them it will be necessary to lift over 300 feet, an out-put of 500 tons a day. From 150 to 200 men go up and down on the cages daily. For these reasons it is most important that the hoisting works should be safe.

While the shafts we-e being sunk and for several months afterward buckets were used for hoisting. During the process of sinking, no accident is recorded at any of the shafts; but after the headings were begun in the tunnel and before cages were put in, some of the worst and most inexcusable accidents occurred. About one-third of the fatal accidents occurred with buckets after the shafts were down and before cages were put in. There were eleven such fatal accidents. Since the cages have been used only three fatal accidents have occurred in hoisting, and for two of these the men killed were solely responsible. The shafts are now properly timbered and equipped with guides and cages. The cages that we saw had safety catches, but usually they were only covered on one side to protect men from being struck on the head by any thing falling down the shafts. The cages should all be covered. The engines and drums, so far as seen, were fitted for their work. The wire ropes were in fair order, but they should be constantly watched, and replaced with new ropes whenever the old ones become weakened by wear.

If speaking tubes from the bottom to the top of all the shafts are not already provided they should be put in, in addition to the usual means of signaling; and notice should always be given to the engineer when men are to be hoisted or lowered, in order that special care may be taken. The inspectors of mining appliances should constantly observe the condition of the wire ropes and other parts of the hoisting apparatus, and the rules followed in hoisting men and rock, and should report weekly, in writing, the condition of each shaft.

4. *Methods of Work in Tunnels.*

The rock through which the aqueduct is excavated is generally gneiss, with occasional beds of limestone. The strata are highly inclined, or nearly vertical, and in general are running in the direction of the work. The formation is much fissured, and in some places the seams carry considerable quantities of water. The size of the tunnel, as actually excavated, is over seventeen feet high by fifteen to sixteen feet broad. So large and high a roof often has to be supported by timbering. So far as observed this seemed to be properly and safely done. The dangers from fall of rocks from the sides or roof are now mainly near the extreme ends, or headings, where work is in progress.

The upper half of the tunnel is blasted out a little in advance of the lower, making a step or bench. The advanced work is called the "heading," and that which follows the "bench." When working full, four Ingersoll drills run by compressed air are drilling holes in the heading, and two on the bench. Twelve men are required to work the six drills. Eighteen men, called "muckers," are employed in clearing away the debris of the previous blasting, called "muck." This is loaded into cars drawn by a mule, hauled to the shaft, and hoisted to the surface, where it is disposed of on the dump. Two drivers are engaged in running the cars to each heading. A "muck boss" and a "shift boss" are also near the heading, and a drill carrier goes to and fro between the drills and the blacksmith shop on the surface. Three ditchers are generally employed in the tunnel, blasting out a drainage ditch. There are, therefore, thirty-eight to forty men, and two mules at work in each tunnel where excavation is in progress. Where the brick work lining of the tunnel is also being put in, there may be ten to fifteen more men.

The methods of drilling, loading and blasting are proper so far as could be learned, but due care has not been used at some of the shafts to avoid drilling into old holes containing unfired cartridges. Two accidents, involving four deaths and four injuries, have happened from this cause at shaft 6 and shaft 9. It would appear that the drilling could be so managed as to prevent such accidents, by carefully examining the holes after firing, and by drilling so as not to cut old holes.

In the matter of loading the holes, greater care is evidently needed at some of the headings. Masses of rock in the roof and

sides of the tunnel at the heading are loosened by the blasts, and liable to fall upon the men. Constant watchfulness and judgment on the part of the boss are needed to detect these loose masses of rock, and to either pull them down, or timber them up. A boss of untiring vigilance, judgment and decision can prevent the greater part of the severe accidents which occur from these falls of rock. In this duty he will be greatly aided by proper ventilation and lighting of the tunnel. In most of the workings gasoline torches and miner's lamps are used. The light from them is comparatively dim, and they throw off large volumes of smoke, which hang about the upper part of the tunnel, greatly increasing the difficulty of seeing the character of the roof. Shaft 12 B., under contractors O'Brien & Clark, is thoroughly lighted with electric light, and so free of smoke that every foot of the roof is plainly visible. There has never been but one accident at this shaft, and that occurred before the electric lights were put in. It was not a fatal one. There is no doubt that complete lighting of all the workings with electric light would greatly add to the safety of the men.

5. *Ventilation.*

The lack of sufficient ventilation in the tunnels is the most serious evil to which the men are exposed. From 100 to 200 pounds of dynamite are discharged daily in each heading, producing great quantities of smoke and gases. The air of each tunnel is also fouled by the smoke and products of combustion from many torches and lamps, and, as previously said, by the men and mules.

Shaft 9 was visited some four hours after the morning blasting had been done. The upper part of both tunnels was found filled with smoke and mist, which to a lesser degree pervaded the whole tunnel. Poisonous gases were also present in such quantities as to affect the head most uncomfortably. Much of the roof near the headings was invisible on account of smoke. The air immediately at the faces of the work was, however, better than elsewhere, for there the drills discharge compressed air.

An air box of about two square feet in cross section extends from the mouth of the tunnel to within about 200 feet of the face. Near the inner end of this box it is entered by a small pipe, a branch from the pipe carrying compressed air to the drills. Through this small pipe a jet of compressed air is thrown into the air box, so as to make a current in it toward the mouth of the tunnel, for the purpose of exhausting the bad air from near the end of the tunnel. These ventilators were not at work at the time of the inspection, and it was stated by those in charge that it was not the custom to run the ventilators for more than an hour or two at most after firing in the morning and evening. For the rest of the day and night, the men are left to the natural ventilation created by the difference of temperature and density between the external air and that of the tunnel, and between the upper and

lower strata of air in the tunnel itself, and to the air discharged by the drills. The day of the inspection was a specially favorable one for the action of this natural ventilation, but its utter insufficiency was proved by the wretched condition of the air in the tunnels. The air jet was turned on and the current in the boxes measured with an anemometer. The boxes proved capable of removing from the tunnel 3,000 cubic feet of air per minute. If this amount was constantly drawn out of the tunnel by the ventilator, 3,000 cubic feet of fresh air would flow in along the tunnel and from the drills to replace it. The fresh air will, however, flow in along the floor of the tunnel, leaving the foul, warm air above it, if the warm air, gases and smoke are allowed to get back from the heading far into the tunnel. Near the heading the temperature is from five to eight degress higher at the roof than at the floor. The gases thrown out from the blasts are of course very hot and largely rise to the roof. To intercept and draw out this upper stratum of foul air and smoke the ventilating box should have an intake near the roof. With this arrangement, and with a constant current of sufficient power in the box, it would be possible to keep the air good. At all of the shafts visited where work was in progress the air was very bad excepting No. 12 B, and 17. There the ventilators were of spiral riveted pipe made of sheet iron and tar coated. The air was exhausted from them by Baker blowers. At 18, a blast had just been fired, but at 12 B, as well as the others, the system of ventilation is wrong in that it is *intermittent* and not *continuous*.

In Pennsylvania the mining laws require that "the owners or agents of every coal mine shall provide and establish for every such coal mine an adequate amount of ventilation, and not less than 3,300 cubic feet per minute of pure air for every fifty men at work in such mine, and as much more as circumstances may require, which shall be circulated through the face of each and every working place throughout the entire mine." A similar requirement should be made of the contractors on the New Aqueduct, considering the very large quantity of poisonous gas produced by the explosives, and the number of men employed near the the headings.

Mowbray on Tri-nitro glycerine gives the following as the gases evolved by complete combustion of nitro glycerine:

Carbonic acid	45.72
Binoxide of nitrogen	20.36
Nitrogen	33.92
Total	100.00

But there must be a great difference in the effects of the different explosives according to the accounts of those using them on the New Aqueduct.

Ditman explosive, a form of nitro glycerine, is said to give off noxious fumes greatly affecting the men and causing vomiting.

Forcite is much less noxious, and Rack-a-Rock least noxious of all, but it gives off large volumes of dense smoke and seems to affect the eyes.

The contractors have relied largely on the drills to supply fresh air continuously to the men, but the quantity thus furnished is totally insufficient. There are at each heading six drills at most. Each of them is supplied with from fifty to sixty cubic feet of compressed air per minute, the discharge of which will furnish per minute some 1,000 to 1,200 cubic feet of air at ordinary pressure.

In view of the fact that, as has already been stated, forty men, sometimes more, and two mules are employed in each tunnel, and the air is fouled by smoke and poisonous gases from the explosion of large amounts of dynamite, from three to four pounds of which are used on the average for every cubic yard excavated, and further fouling of the air is effected by the lights and the excreta of the men and mules, it is probable that the tunnels cannot be kept in a wholesome condition without a continuous supply to each heading of 3,000 cubic feet of air per minute, the currents to be so managed as to remove all gas, smoke and foul air. The present conditions are already bad, but they are likely to become rapidly worse as summer approaches and the tunnels get further from the shafts.

The engineers in charge of the work suffer from the bad air, and the process of alignment is seriously interfered with by the smoke and mist in the tunnels. The engineers also say that the smoke often prevents a proper inspection of the roof, and the detection of masses of rock shattered by the blasts and liable to fall.

Owing to complaints of the ventilation, two mining engineers were appointed in January last to inspect the shafts constantly, take observations, and report to the chief engineer.

Appended to this report, and marked "A," will be found a general report made to Chief Engineer Church by inspector C. L. Kalmbach, on ventilation, and another, marked "B," giving the record of experiments and observations on temperature and ventilation at the different shafts in January and February last.

In paper marked "C," are given a number of letters dating from February till April, showing what efforts have been made by Chief Engineer Church and his subordinates to compel the contractors to properly ventilate the tunnels. In general, these efforts seem to have failed, because the chief engineer has not the power to enforce his demands. The contractors who will not heed competent and urgent advice, and provide proper ventilation for the tunnels and pure air for the thousands of men employed should now be compelled to do so by the power of the State.

6. *Accidents.*

The New Aqueduct has attained already an unenviable notoriety on account of the number of accidents which have occurred in its construction during the past year, and many unfavorable compari-

sons have been drawn between this work and others where fewer casualities have happened. In judging of this matter, however, it is necessary to take into consideration the magnitude of the operations, the geological conditions, the number of headings and shafts worked, the rate of progress, the limit of time allowed for completion, the number of men employed, and the power of the engineers over the methods and men.

Works like that under the United States engineers at Flood rock, which are not conducted for profit, where there is no absolute limit either to the time or cost of the undertaking, and where the men are working for daily wages directly under the engineers, who prescribe the methods of work and are responsible for their safety, should have a much smaller number of accidents than works executed by contract where the profits often depend on using the cheapest possible labor that can do the work, and on pushing the construction at the highest speed.

It must be remembered, too, that the New Aqueduct is the longest tunnel of its size in the world, and that work is rapidly progressing at a great number of headings. With the exception of about one and one-quarter miles of open cut the rock tunnel is practically continuous for twenty-nine and three-quarters miles, passing under high hills and one deep river valley. The average cross section excavated is 240 feet, being from seventeen to eighteen feet high and fifteen to sixteen feet broad. The excavation is carried on by means of thirty-two shafts about a mile apart, varying in depth from twenty-eight to 350 feet, and by two open portals. There are fifty-four or fifty-five headings in progress, the working headings each week averaging about forty-four. Since January first, Brown, Howard & Co., have averaged thirty-nine and two-tenths lineal feet per week of completed excavation at each heading; O'Brien & Clark, thirty-two and two-tenths feet, and Heman Clark, thirty-five and nine-tenths feet. Brown, Howard & Co., have made a weekly maximum average progress per heading of forty-four and three-tenths feet; O'Brien & Clark have not exceeded forty-one feet; Heman Clark has reached forty-four and two-tenths feet. The total amount of rock excavated from the tunnel has been about 1,100,000 tons.

The average number of men employed is probably about 4,250, of whom perhaps 3,500 work underground.

With these facts in mind showing the great scale of the operations, one is prepared to judge more justly of the number of casualties to be expected.

The following is a list of accidents classified by contracts, etc., and taken from the records in office of the chief engineer.

A synopsis of the record of accidents and their causes as reported to the office of the chief engineer is given in "D," appended. The record begins in May, 1885, and is supposed to include all that have occurred up to April 1, 1886. From this record the following tables have been compiled:

TABLE I.

Summary of accidents on the New Aqueduct from May 1, 1885, to April 1, 1886 — classified by contracts — men employed and work performed.

	Fatal.	Non-fatal.	Total.	Average number of men employed.	Total lineal feet of tunnel excavated.	Tons of rock excavated.	Average depth of working shafts or slopes.	Number of headings working.	Average rate of progress per month in lineal feet per working heading.
Smith & Brown, gate houses	....	3	3	76	....	....	..	....	....
Brown, Howard & Co	18	31	49	1,431	24,478	500,000	177	20	183
O'Brien & Clark	12	22	34	1,194	18,445	369,000	58½	15½	150
Heman Clark	4	7	11	642	11,781	227,300	108	9	166
Totals	34	63	97	3,343	54,704	1,096,300	*122	44½	499

* Average depth for entire work.

TABLE II.

Accidents classified by Shafts and Divisions.

No. of division.	NAME OF CONTRACTOR.		Fatal.	Non-fatal.	Total.	Depth of shaft.	Length of tunnel excavated.
1...	Smith & Brown	Inlet gate-house	....	1	1	.....	.. ...
1...	Smith & Brown	Large gate-house		2	2	.....	.....
1...	Brown, Howard & Co	Shaft 0	1	2	3	210	2,048
1...	Brown, Howard & Co	Shaft 1	....	1	1	333	1,158
1...	Brown, Howard & Co	Shaft 2	....	....	...	349	247
1...	Brown, Howard & Co	Shaft 3	8	5	13	350	709
1...	Brown, Howard & Co	Shaft 4	1	2	3	246	2,447
			10	13	23	......	......
2...	Brown, Howard & Co	Shaft 5	1	1	2	108	2,635
2...	Brown, Howard & Co	Shaft 6	3	5	8	178	1,692
2...	Brown, Howard & Co	Shaft 7	2	4	6	161	2,236
2...	Brown, Howard & Co	Shaft 9	2	7	9	Open portal.	3,633
			8	17	25	...	.....
3...	Brown, Howard & Co	Shaft 10	....	4	4	125	3,015
3...	Brown, Howard & Co	Shaft 11A	....	....	....	31	2,483
3...	Brown, Howard & Co	Shaft 11B	..	..	....	34	2,345
3...	O'Brien & Clark	Shaft 12A	...	1	1	41	1,434
3...	O'Brien & Clark	Shaft 12B	...	1	1	38	1,158
			....	6	6	.....	....
4...	O'Brien & Clark	Shaft 13	1	....	1	154	1,424
4...	O'Brien & Clark	Shaft 14	3	9	12	28	2,783
4...	O'Brien & Clark	Shaft 15	1	4	5	126	1,848
4...	O'Brien & Clark	Shaft 16	4	3	7	72	2,685
			9	16	25	......	.....
5...	O'Brien & Clark	Shaft 17	...	2	2	59	2,973
5...	O'Brien & Clark	Shaft 18	2	....	2	Open portal.	2,130
5...	O'Brien & Clark	Shaft 18½	1	2	3	......	......
5...	O'Brien & Clark	Shaft 19	....	....	...	67	2,010
			3	4	7	......	....
6...	Heman Clark	Shaft 20	2	3	5	115	2,666
6...	Heman Clark	Shaft 21	1	...	1	102	2,583
6...	Heman Clark	Shaft 22	1	1	2	81	2,934
6...	Heman Clark	Shaft 23	....	1	1	65	2,945
6...	Heman Clark	Shaft 24	....	2	2	176	713
			4	7	11	...	......
	Totals		34	63	97	3,249	54,704

TABLE III.

NUMBER OF SHAFT, OR PLACE OF WORKING, BEGINNING AT CROTON DAM.	Total fatal accidents.	Total and fatal accidents.	Average number of employes per monthly.	Length of tunnel excavated to March 27, 1886.	Depth of working shaft or slope.	Number of headings worked.	Name of contractor.	PROBABLE CHARACTER OF ACCIDENT RESPECTING PREVENTABILITY. Preventable by proper method of working. Fatal.	Preventable by proper method of working. Non-fatal.	Preventable by proper supervision by contractors. Fatal.	Preventable by proper supervision by contractors. Non-fatal.	Possibly unavoidable. Fatal.	Possibly unavoidable. Non-fatal.	Personal carelessness of men. Fatal.	Personal carelessness of men. Non-fatal.	Purely accidental. Fatal.	Purely accidental. Non-fatal.
Inlet gate-house	.	1	18	......	......	......	Smith & Brown	......	....	......	......	......	......	......		....	1
Large gate-house	..	2	68	......	......	......	Smith & Brown	......	....	......	......	......	......	......		....	2
Shaft 0	1	2	92	2,048	Incline 210	1	Brown, Howard & Co.	......	....	......	......	......	......	1		....	....
Shaft 1	..	1	72	1,158	333	2	Brown, Howard & Co.	......	....	......	......	......	1	......	....	....	....
Shaft 2	..	..	38	217	349	2	Brown, Howard & Co.	......	....	......	......	......	......	......	....	....	....
Shaft 3	8	5	75	709	350	2	Brown, Howard & Co.	8	....	......	2	......	3	......	....	....	....
Shaft 4	1	2	117	2,447	246	2	Brown, Howard & Co.	......	....	1	2	......	......	......	....	....	....
Shaft 5	1	1	149	2,625	108	2	Brown, Howard & Co.	......	....	......	1	......	......	1	....	....	....
Shaft 6	3	5	99	1,692	178	2	Brown, Howard & Co.	......	....	2	1	......	......	1	2		2
Shaft 7	2	4	126	2,226	161	2	Brown, Howard & Co.	......	....	1	......	......	......	1	4	....	....
Shaft 9	2	7	263	3,633	Open portal	2	Brown, Howard & Co.	......	1	2	5	......	......	......	1	....	....
Shaft 10	..	4	169	3,015	125	2	Brown, Howard & Co.	......	1	......	2	......	1	......	....	....	....
Shaft 11 A	..	..	122	2,433	31	2	Brown, Howard & Co.	......	....	......	......	......	......	......	....	....	....
Shaft 11 B	..	..	109	2,245	34	2	Brown, Howard & Co.	......	....	......	......	......	......	......	....	....	....
Shaft 12 A and open cut	..	1	79	1,434	41	2	O'Brien & Clark	......	....	......	......	......	......	......	1	....	....
Shaft 12 B	.	1	75	1,158	38	......	O'Brien & Clark	......	....	......	......	......	1	......	....	....	....
Shaft 13	1	..	75	1,424	154	2	O'Brien & Clark	......	....	......	......	......	......	1	....	....	....
Shaft 14 and Ashford cut	3	9	174	2,783	28	2	O'Brien & Clark	......	....	1	5	1	2	......	1	1	1
Shaft 15	1	4	82	1,848	126	2	O'Brien & Claak	......	....	......	......	1	2	......	1	....	1
Shaft 16	4	3	118	2,685	72	2	O'Brien & Clark	......	....	3	1	......	......	1	2	....	....
Shaft 17	..	2	168	2,973	59	2	O'Brien & Clalk	......	....	....	......	......	2	......	....	....	....
Shaft 18	2	..	195	2,130	Open portal	2	O'Brien & Clark	......	....	2	......	......	......	......	....	....	....
Shaft 18½	1	2	102	......	......	2	O'Brien & Clark	......	....	......	1	......	......	1	1	....	....
Shaft 19	..	..	126	2,010	67	2	O'Brien & Clark	......	....	......	......	......	......	......	....	....	....
Shaft 20	2	3	182	2,666	115	2	Heman Clark	......	....	......	......	1	......	1	1	....	2
Shaft 21	1	..	164	2,523	102	2	Heman Clark	......	....	......	......	......	......	......	....	1	....
Shaft 22	1	1	127	2,934	81	2	Heman Clark	......	....	......	......	......	......	1	1	....	....
Shaft 23	..	1	116	2,945	65	2	Heman Clark	......	....	......	......	......	1	......	....	....	....
Shaft 24	..	2	53	713	176	2	Heman Clark	......	....	......	1	......	......	......	1	....	....

TABLE III—(*Continued*).

NUMBER OF SHAFT, OR PLACE OF WORKING, BEGINNING AT CROTON DAM.	CAUSE OF ACCIDENT. Accidents with buckets.		Accidents with cages.		Accidents with cars.		Accidents from rock falls.		Accidents from explosions of old holes.		Accidents from explosions while charging.		Accidents from explosions of powder-house and blasts.		Accidents from falls of men.		Accidents from machinery.		Accidents from miscellaneous causes.		Number of division.
	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	
Inlet gate-house	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	
Large gate-house	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	Division 1
Shaft 0	....	....	....	....	1	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	"
Shaft 1	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	"
Shaft 2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	"
Shaft 3	8	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	3	"
Shaft 4	....	....	....	....	....	....	1	2	....	....	....	....	....	....	....	....	....	....	....	....	"
Shaft 5	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	"
Shaft 6	1	....	....	....	....	1	....	....	2	....	....	....	....	....	....	1	....	3	....	....	Division 2
Shaft 7	1	2	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	"
Shaft 9	....	....	....		....	....	....	....	2	4	....	1	....	....	....	2	....	....			"
Shaft 10	....	....	....		....	....	....	2	....	....	....	....	....	....	....	....	....	1			"
Shaft 11 A	....	....	....		....	....	....	....	....	....	....	....	....	....	....	....	....	....			Division 3
Shaft 11 B	....	....	....		....	....	....	....	....	....	....	....	....	....	....	....	....	....			"
Shaft 12 A and open cut	....	....	....		....	....	....	....	....	....	....	....	....	....	....	1	....	....			"
Shaft 12 B	....	....	....		....	....	....	1	....	....	....	....	....	....	....	....	....	....			"
Shaft 13	....	....	1		....	....	....	....	....	....	....	....	....	....	....	....	....	....			Division 4
Shaft 14 and Ashford cut	1	....	....		....	....	1	7	....	....	....	....	....	....	1	....	....	1			"
Shaft 15	....		....		....	....	1	3	....	....	....	....	....	....	....	....	....	....			"
Shaft 16	....				....	....	....	1	....	....	3	....	....	....	....	1	1	....			Division 5
Shaft 17	....				....	....	....	....	....	....	....	....	....	2	....	....	....	....			"
Shaft 18	....				....	....	....	....	....	....	....	....	....	....	....	2	....	....			"
Shaft 18½	....				....	....	....	....	....	....	....	....	1	1	....	....	....	....			"
Shaft 19	....				....	....	....	....	....	....	....	....	....	....	....	....	....	....			"
Shaft 20	....		1		....	8	1	....	....	....	....	....	....	....	....	....	....	....			Division 6
Shaft 21	....		1		....	....	....	....	....	....	....	....	....	....	....	....	....	....			"
Shaft 22	....				....	....	....	....	....	....	....	....	1	1	....	....	....	....			"
Shaft 23	....				....	....	....	1	....	....	....	....	....	....	....	....	....	1			"
Shaft 24	....	....			....	....	....	1	....	....	....	....	....	....	....	....	....	....			"

TABLE III — (Continued).

Number of shaft, or place of working, beginning at Croton Dam.	Approximate number of men employed each month.											Time of occurrence of accident.																					
	1885.								1886.			1885.														1886.							
												May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		March.	
	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.	Fatal.	Non-fatal.
Inlet gate-house	....	....	....	....	....	....	8	24	24	16	....																				1		
Large gate-house	....	....	....	....	33	50	68	87	86	75	76														1		1						
Shaft 0	44	70	83	100	89	110	110	93	104	112	96									1	2												
Shaft 1	32	36	32	32	28	36	66	60	87	151	227																				1		
Shaft 2	32	36	37	36	36	34	36	33	30	45	67																						
Shaft 3	32	33	34	44	42	47	67	54	83	150	240													3		5			1		2		2
Shaft 4	26	30	35	48	69	165	193	160	199	207	183														2	1							
Shaft 5	35	48	108	130	133	202	215	192	204	189	186									1							1						
Shaft 6	30	27	30	33	48	93	112	195	171	173	180										2	1		2			4		1				
Shaft 7	26	31	46	102	83	179	187	208	293	171	170									1						1	1						1
Shaft 9	237	288	332	289	334	296	279	236	113	251	251	2	4												1				1		1		
Shaft 10	40	50	160	168	224	228	216	224	200	176	*														2		1						1
Shaft 11 A	100	108	108	124	116	152	136	132	133	115	*																						
Shaft 11 B	92	106	100	108	112	121	116	112	114	109	*																						
Shaft 12 A	56	52	44	60	64	96	88	96	125	109	*																1						
Shaft 12 B	56	56	60	64	60	52	84	98	162	63	*		1																				
Shaft 13	38	28	34	38	72	114	99	117	112	100	73										2	1											
Shaft 14	109	154	179	229	262	212	197	187	163	112	111	1								1	2	1	5		1		1						
Shaft 15	86	39	27	88	98	86	108	97	106	108	109											1	1				1						
Shaft 16	47	72	112	155	144	133	117	130	142	113	*		1*										1								1	4	
Shaft 17	106	137	168	150	157	218	179	196	210	154	174																2						
Shaft 18	198	184	184	169	261	*	387	203	112	88	168									2													
Shaft 18½	....	....	....	....	....	13	63	63	113	160	200																1			1	1		
Shaft 19	95	108	126	108	104	144	108	142	148	132	174																						
Shaft 20	56	69	129	262	216	218	282	226	294	138	162											2							3				
Shaft 21	77	127	145	163	182	192	171	158	219	237	136											1											
Shaft 22	61	82	79	106	94	145	130	150	165	124	159																			1	1		
Shaft 23	44	84	57	114	108	141	128	151	161	138	154																						
Shaft 24	43	37	29	28	42	57	62	50	75	76	86														1		1						

* Unknown.

TABLE IV.

Accidents Classified as to Cause and Preventability.

From May 1, 1885.		Smith & Brown.	Brown, Howard & Co.	O'Brien & Clark.	Heman Clark.	Total.
Cause.						
With buckets	Fatal	...	10	1	...	11
	Non-fatal	....	2	1	....	3
With cages	Fatal	....	1	1	2	4
	Non-fatal	....	1	2	....	3
With cars	Fatal	....	1	...	....	1
	Non-fatal	....	4	....	8	7
From rock falls	Fatal	....	1	2	1	4
	Non-fatal	2	7	12	2	23
From explosion of old holes	Fatal	....	4	...	...	4
	Non-fatal	..	4	....	....	4
From explosions while charging	Fatal	..	...	3	....	3
	Non-fatal	....	1	...	....	1
From explosions of powder-house and blasts	Fatal	...	...	1	1	2
	Non-fatal	....	1	3	1	5
From falls of men	Fatal	...	1	1	....	2
	Non-fatal	1	3	2	..	6
From machinery	Fatal	...	...	3	....	3
	Non-fatal	...	4	1	1	6
From miscellaneous causes	Fatal	...	.	....	..	.....
	Non-fatal		4	1	.	5
Preventability.						
Preventable by proper methods of working	Fatal	...	8	...	....	8
	Non-fatal	....	2	...	...	2
Preventable by proper supervision by contractor	Fatal	..	6	6	...	12
	Non-fatal	...	13	7	1	21
Possibly unavoidable	Fatal	...	....	2	1	3
	Non-fatal	...	5	7	1	13
Personal carelessness of men	Fatal	...	4	3	2	9
	Non-fatal	...	9	6	3	18
Purely accidental	Fatal	..	.	1	1	2
	Non-fatal	3	2	2	2	9

TABLE V.

From May, 1885, to April 1, 1886.	Smith & Brown.	Brown, Howard & Co.	O'Brien & Clark.	Heman Clark.	The whole aqueduct.
Percentages of total accidents under each contractor:					
Fatal	......	53	35	12	100
Non-fatal	5	49	35	11	100
Number of men employed to each accident:					
Fatal	......	80	100	161	98
Non-fatal	25	46	54	92	53
Death rate from casualties, per 1,000 men	......	$12\frac{6}{10}$	10	$6\frac{2}{10}$	$10\frac{2}{10}$
Non-fatal accidents, per 1,000 men	$39\frac{5}{10}$	$21\frac{7}{10}$	$18\frac{4}{10}$	$10\frac{9}{10}$	$18\frac{8}{10}$
Lineal feet of tunnel run, per man killed	......	1,360	1,537	2,945	1,609
Lineal feet of tunnel run, per man injured	......	790	838	1,683	868
Tons of rock excavated, per man killed	......	27,778	30,750	56,825	33,714
Tons of rock excavated, per man injured	......	16,129	16,773	32,471	18,195

Table I shows the accidents classified according to the contractors under whom they occurred, as the contractors are the parties directly responsible for the men, the number of men employed and the work done.

In Table II the accidents are classified by the shafts and and divisions at which they occurred. Each division is under charge of a special engineer. This classification shows a difference in the number of accidents occurring under different contractors, under different division engineers, and at different shafts. For instance, at shafts 1 and 2, in Brown, Howard & Co's contract and under the engineer of the first division, there have been hardly any accidents, in fact but one, although these are two of the deepest shafts in the whole work, one being 333 feet, and the other 349 feet. At the next shaft, number 3, under the same contractors and under the same engineer, they have had eight fatal and five non-fatal accidents, making a total of thirteen. Such remarkable contrasts in the number of casualties in shafts of approximately the same depth, cannot be merely the result of chance. To determine more fully all the conditions that may influence this matter, Table III was prepared showing the relation of the accidents to all those statistics of work which might bear upon the question of their occurrence. The cause of the accidents is also given, classified under ten different heads, and an attempt has been made to classify them also by the probable character of the accidents as respects their preventability. The result of Table III are given in a more compact form in Table IV. Here the classification as regards preventability is more compact and easily understood.

Table V shows the casualties in percentages and in their relation to the work performed, and number of men employed.

In deciding as to the preventability of accidents, it has been neccessary to rely for the facts mainly upon the full reports in the office of the chief engineer, and upon the evidence obtained by the committee in questioning various witnesses. We have, however used our own discretion in deciding what were or were not proper methods of working and what must be considered proper supervision.

Of the fatal accidents, it is beyond question, that the eight which occurred at shaft 3 were due to the improper method of working. The shaft was being operated with a bucket. To prevent this from swinging and whirling in the shaft, we are informed that guides were put on the timbers on which a bar was to run following the bucket down and preceding it as it went up. The bucket rope passed through this bar without being attached to it, and the bar was expected to rest on the swivel above the bucket and go up and down with it. No provision whatever appears to have been made for the possibility of this bar sticking in the guides, and afterward, when shaken loose by the movement of the

rope, falling on the bucket below. As near as we can learn this is what actually occurred in the latter part of November. The shaft was already then down to the tunnel level, to which point it had been sunk by a sub-contractor, who then resigned the work into the hands of the principal contractors, by whom the tunnel was being run. No accident of any kind is recorded as having occurred during the sinking of the shaft by the sub-contractor.

The device of the following-bar above the bucket was a dangerous one, and if adopted at all, should have been guarded with the greatest care. The bar stuck in the guides, as might have been expected, and the bucket started down without it. The following-bar was, however, soon shaken loose by the robe and fell upon the bucket, killing three men.

It does not appear that any precaution was taken to prevent a recurrence of this accident, and nine days afterward the bar again stuck and fell, killing this time five men.

After having killed eight men by this ingenious device, it appears that the contractors attached a piece of rope to the following-bar by which the men in the bucket could control it. These facts seem to warrant the classifying of these eight deaths under "preventable by proper method of working."

Twelve deaths are classified under the head of "preventable by proper supervision by contractor." Two of these were at shaft 6, and two at shaft 9, where explosions occurred from drilling into old holes, accidents which apparently could have been avoided by proper care on the part of the bosses. Some of the twelve are also from rock falls which would appear to have been preventable in certain cases; others are from the breaking of badly-worn wire ropes used in hoisting. A certain proportion of the accidents from rock-falls have been placed under the class of accidents "possibly unavoidable." Nine deaths appear as due to "personal carelessness on the part of the men," and two as "purely accidental."

While the past record of the aqueduct for accidents is not as good as it should have been, a decrease in casualties may reasonably be expected. When one considers the classification in Table IV, the case of accidents, it appears that eleven fatal accidents occurred with buckets, while only four occurred with cages. Nearly one-third of the fatal accidents on the work were with buckets. It may, therefore, be inferred that since all the shafts are equipped with cages there will be a decided reduction in the number of fatal accidents.

Of the fatal accidents only four out of thirty-four were from rock falls; only seven fatal accidents have occurred from explosions in the tunnel. Of the non-fatal accidents, more than one-third have occurred from rock-falls, as might have been expected.

Table V shows first the percentages of accidents which have occurred under each contractor and also the number of men employed to each accident. It shows the death-rate under each

contractor and for the whole work, and the number of lineal feet run per man killed and per man injured for each contractor and for the whole work, and the amount of rock excavated per man killed and per man injured. The death-rate of the whole work from casualties has been a little over ten to a thousand; and more than 1,600 feet of tunnel have been run and 33,000 tons of rock excavated for each man killed. From this last table comparisons can be made between casualties at the New Aqueduct and those upon similar works.

In seeking other works to compare with that of the New Aqueduct the work seems only directly comparable with that in single track railway tunnels. The ordinary tunnels in mines are too small to be contrasted with the New Aqueduct. The dangers of tunneling greatly increase with the height and span of roof. Nor does it seem fair to contrast the casualties with those in coal mining, because this is a regular and constant industry where the work has been thoroughly systematized, and in which the men employed are trained from boyhood to understand and avoid the dangers of the work. The casualties too, in coal mining, have been greatly reduced by the strict laws of the mining States, and the constant inspection of mines by inspectors acting under State authority.

In the first mining district of Pennsylvania, which includes a great number of large anthracite mines, the average number of men employed for five years, from 1875 to 1879, inclusive, was 5,643, and the average number of men killed was twenty-four each year. Of the men employed in the anthracite district, however, not nearly so large a proportion were underground as on the Aqueduct. It is probable that the number of men actually employed underground during those five years did not vary very much from the number engaged upon the aqueduct in underground work.

From 1880 to 1884, inclusive, there were in the above-named district 6,846 employed per annum on the average, and there were 17.4 men killed per annum. This shows a great reduction in the mortality in the casualties over the preceding five years. In 1884 with 7,114 men employed there were only fifteen fatal accidents. During the last ten years the maximum of fatalities shows, in one year, twenty-eight deaths to an average of 4,626 mem employed. In the second district of Pennsylvania in 1884, there were 4,456 *miners* employed, excluding the men working above ground, twenty-five were killed and seventy-four injured. It, therefore, appears that the casualties on the Aqueduct have been greater than in coal mining, but in comparing it with railroad tunnels the Aqueduct does not appear so unfavorably. It is very difficult to get statistics of accidents on railroad tunnels that have been run in this country. For obvious reasons the reports do not usually show them, but in a general way it may be said that the accidents on the Hoosac Tunnel greatly outnumbered those on the New Aqueduct in proportion to the work done. As compared too with the fatalities at the

various tunnels on the West Shore road the number of accidents is not excessive for the length of tunnel run; but the cross-section was more than twice as large as that of the Aqueduct. At the St. Gotthard Tunnel there were in 1875, sixteen fatal and forty-seven non-fatal, and in 1876, twenty-four fatal and eighty-one non-fatal accidents. But at the St. Gotthard Tunnel only two headings were run and at the Hoosac Tunnel only four headings, while in the New Aqueduct there have been on the average forty-four or forty-five headings actually working since last November. All of the shafts except four were down and work on the tunnel headings begun by July of 1882, and more than ten miles of tunnel have been excavated during the past year. While there seems little question that a large number of the accidents that have occurred could have been prevented, yet considering the amount of work accomplished, the large number of working places, the depths of the shafts, inexperience of many of the men, and above all, the fact that it was a new work, just being systematized, it does not appear to have had a much greater number of accidents than similar works under like conditions.

If ordinary proper care is used the accidents during the present year should be much less in number than those of the past.

Respectfully submitted,

LEWIS BALCH,
Secretary.

JAMES T. GARDINER,
Consulting Engineer.

"A."

REPORT OF INSPECTOR KALMBACH TO CHIEF ENGINEER ON VENTILATION.

The problem of the efficient ventilation of the shafts and tunnels on this work rests on these two axioms: first, that nature abhors a vacuum, and second, that its temperature determines the specific gravity of air of like quality. Of the deleterious gases encountered in the tunnels, none are lighter than ordinary fresh air at like temperature, but one at least, carbonic acid gas, is much heavier. This fact, together with the simplicity of the excavation which consists only of shaft and straight tunnel on one level, ought to make the perfect ventilation a very easy matter. I mean that there is no fire damp or hydrogen, and there are no galleries on different levels and no chambers.

I have taken a series of temperatures during the cold weather and reported the same to you. You will notice that in every instance when the temperature of the atmosphere was in the neighborhood of the freezing point, the lowest temperature in tunnel was on the floor near the shaft. Thence along the floor to the

heading the mercury gradually rises until the highest point is reached in the heading. Following the roof from heading to shaft the temperature decreases in the same ratio, but is always from two to five degrees warmer than that on the floor. The only exception so far is the observation at 11 B of February ninth, but the temperature outside was forty-nine degrees, and, consequently, the temperatures inside were nearly balanced, which also balanced the gravities of the outer air with that in the tunnel.

You will notice a great difference in temperatures between shafts 12 A and 12 B, and shafts 10 and 11 A and 11 E. In one instance as much as fifteen degrees. You have also noticed that the higher temperatures are associated with much smoke and foul air. The ground or rock is of like and uniform temperature, the exposures are the same, and the difference can only be the result of artificial conditions.

I see two important factors to account for the variation, one the system for lighting the work, the other the ventilation. At 12 A and 12 B the electric light is in constant successful use, successful, I mean, as compared with 11 A and 11 B. They have four good arc lights to 1,000 feet of tunnel in the 12's and only three in 2,000 feet in the 11's. In the latter they use kerosene lamps and gasoline torches to get about with, to look for tools, change switches, etc., and they *almost* succeed in making the darkness visible and in filling the tunnel with smoke. At 12, the electric lamps enable one to find his way without carrying an extra light.

At 12, they use a 5½ Baker blower, 9,000 cubic feet capacity per minute, to exhaust smoke and gases, or to blow in fresh air, as seems best to them, and at this season the air and temperature in their tunnel is always more comfortable than the out-door air.

At the other shafts, however, they are satisfied if the men are not "knocked out," as they call it, when men become sick or even insensible from inhaling vitiated air or noxious gases. The ventilation is a display, either of utter ignorance of the simplest laws of air currents, or a brutal indifference to the comfort, health and life of workmen, to say nothing about their efficiency. It would be perfect if the problem were: *How not to do it.* There is no doubt that the work can be properly lighted and ventilated if advantage is taken of the *best* modern appliances for the purpose, as you can see to some extent at 12. But the very rude means at the other shafts are not even properly used.

The fixtures erected by B., H. & Co., for removing smoke and renewing the air in the tunnel, consist of a flue made of matched boards in a rough manner, generally twelve by twenty-one inches cross section. The exhaust steam of the pump at the bottom of the shaft is turned into the upright portion of the flue in the shaft, in the hope, I presume, that this steam would create the necessary draught. When this did not answer, a so-called jet of compressed air was turned into the horizontal inner end or "intake" of the

"upcast" flue. The jet consists of a piece of one-inch gaspipe, swedged down at the end of about half its size. Rude as this contrivance is, it *does* create a powerful draught at the mouth of the upcast, by the pushing action of the expanding compressed air. If the mouth of the upcast were intelligently placed to take the warm, foul air from near the roof, it might do decent work at a *high cost*, but unfortunately the flue lies along the floor and takes in the cooler and better air that is trying to reach the heading from the shaft, which it descends at this season by reason of its low temperature and greater weight. It also picks up the cooler air released by the drills and flowing down the bench. The cost is excessive because compressed air is used instead of steam, thus losing the heat possessed by the steam as one item; the expansion cooling the air taken in, below the general temperature of the tunnel, and thus increasing the cost of *shoving* it up the flue in the shaft. Lastly, the liability of a large percentage of the air taken in, finding its way back into the tunnel through the numerous joints and cracks in the flue, before it reaches the shaft. This leakage is aided by the shoving, as well as the cooling action of the jet in a long rough flue.

When a blast is fired the gases generated are quite hot at first and fill the entire end of the tunnel. To enable the workmen to go in at all, the compressed air is blown into the heading, the gases are thereby cooled and diluted, and the intake is able to catch a portion of them by another expenditure of compressed air. As soon as the drills commence work again they release air enough to make life possible at the working end, but the rest of the tunnel is in utter darkness and full of smoke. At ten there is no attempt at lighting except gasoline and kerosene so that the *want* of proper *ventilation* is *particularly emphasized*. The thermometer, too, shows a much higher relative temperature on the bench than elsewhere in consequence of the gasoline. One of the gasoline torches will burn as much air as fifteen men would use, so it may be assumed that air enough for 100 *men* should be provided in each working end.

A radical cure for those evils calls for an efficient electric-light plant built for rough usage and a system of ventilation founded on the axiom at the head of this paper. There are several modes of creating draught or attempting a vacuum. The furnace (perhaps the oldest), the pump, the fan or blower and the jet all have their value, and it depends on the work to be done, the situation, the means available and the length of time that the fixture will be required, which one of them all will be the best to adopt.

As there is steam power at every shaft I should advocate a steam jet on the principle of the Giffard injector on a vacuum box connected with the flue leading down the shaft. The intake should be movable so as to take from roof or floor or intermediate points of the tunnel and at more than one place or station in the tunnel.

When firing, the intake should be open near the roof at the extreme end of the flue, it would then take up the powder gases about as fast as generated and give the compressers a couple of hours rest; because no compressed air should be, or need be used, except in the drills. The steam used would be delivered close to the boiler, through a one and one-half inch pipe, and the boiler would rest with the compressor. Another advantage would arise from the ability to clear any intermediate part of the tunnel at any time of smoke or foul air without straining the compressors and boilers or interfering with the drilling.

The advantage of thus ventilating and lighting the tunnel would consist, first, in the superior economy of accomplishing both objects. Next, in the great efficiency of the labor which would work in good air and in full view of the foremen, and lastly, in the better facilites given to the engineers for instrumentation. They would be able to do more correct work in one-fourth the time it takes now to do uncertain work and of course would be, by so much less, a hindrance to the movements of the workmen. The foremen having the entire length of excavation in *full view* would be able, at all times, to locate the outline of the section and note the grade. Loose rock in side or roof could be discovered and watched or removed and the entire work would go much more smoothly than it possibly can with the present arrangements. In the present darkness and smoke in the tunnels proper inspection is well nigh impossible.

Very respectfully,

C. L. KALMBACH,

Inspector.

MEMORANDUM OF TEMPERATURES IN TUNNELS.

Shaft No. 11 *A.*

January 22. Air very foul and smoky.	Deg., Fahr.
surface	38
100 feet from shaft at floor	45
1,000 feet from shaft at floor	54
1,000 feet from shaft at 8 feet above floor	58
foot of bench (floor)	56
roof above bench	62

Shaft No. 12 *B.*

January 25. Air clear except close to roof.	
100 feet from shaft on floor	42
230 feet from shaft at roof	51
foot of bench on floor	50
foot of bench 6 feet above floor	52
roof of heading	54
temperature of water in heading	50
temperature on top or out-doors	37

Shaft No. 12 *A.*

January 27. Air good and clear throughout.	Deg., Fahr.
temperature on surface	35
temperature at foot of bench	49
temperature 2 feet above floor	54
temperature at roof near heading	58

80 feet from the shaft the air on the floor is moving "in" 38 feet per minute.

Shaft No. 9.

January 28. "Air" pretty fair for this locality.	
200 feet from portal at floor	45
200 feet from foot of bench	58
200 feet from top of bench	60
200 feet from roof on bench	64

Speed of current in intake 12 x 21 seconds 2,028 feet; per minute capacity 3,500 feet.

Shaft No. 10.

January 28. Smoke very thick all through.	
on surface	36
on floor 100 feet from shaft	56
at roof 100 feet from shaft	59
on floor at bench	62
at roof on bench	72
February 1. Zero.	
outside temperature	24
at foot of slope	44
at roof of slope	54
at foot of bench	57
at roof of heading	64

Natural ventilation; inward current at foot of slope 44 feet per minute, drawn out through smoke box at rate of 154 feet per minute.

Shaft No. 3.

February 2. Smoke very thick and oppressive.	
outside temperature	24
at floor near shaft	60
at foot of bench	63
at crest of bench	64
at heading	70

Shaft No. 10.

February 6. Very foul and thick except at breast.	
outside	15
foot of shaft	48
top of intake	56
bottom of intake	55
roof at intake	63

Intake carries 417 cubic feet per minute. Thermometer in intake stands 55 degrees.

"B."

REPORTS TO CHIEF ENGINEER ON CONDITION OF VENTILATION AT VARIOUS SHAFTS.

DIVISION No. 1.

Shaft No. "0." South Heading.

February 1, 1886. The following data have direct bearing on the ventilation: At floor foot of slope, 44 degrees; at roof of same, 54 degrees; at floor foot of bench, 57 degrees; at roof of heading, 64 degrees; in muddy water at foot of bench, 58 degrees; out doors, 24 degrees.

The tunnel should have been quite clear of smoke with these temperatures, but when the air currents were measured the smoke was fully accounted for. The box which is near the floor was taking out 154 feet per minute, and the rest was flowing out at the roof of the portal. If the mouth of the box (the intake) were raised (by an elbow and perpendicular) to within two feet of the roof, it would take out only smoke and warm vitiated, instead of the cooler, better air which it intercepts now, on its way to the heading. Such an alteration would not cost over $2, and clear out all the smoke while this weather lasts. At the foot of the slope the air was *flowing in* at the rate of 40 feet per minute.

Shaft No. 1.

February 8, 1886. Ventilation not mentioned. Progress has been a little less than might have been expected owing to bad air.

Shaft No. 3. North Heading.

February 20, 1886. Ventilation particularly bad last week, and in consequence, the work has gone on without line and grade; refused because contractors neglect to clear the tunnel of smoke and gases.

Shaft No. 3. South Heading.

February 20, 1886. Ventilation particularly bad last week, and in consequence the work has gone on without line and grade; refused because the contractors neglect to clear the air of smoke and gases.

Shaft No. 4. North Heading.

February 20, 1886. Ventilation particularly bad last week, and in consequence the work has gone on without line and grade; refused because the contractors neglect to clear the tunnel of smoke and gases.

Shaft No. 4. South Heading.

February 20, 1886. Ventilation particularly bad last week, and in consequence the work has gone on without line and grade; refused because the contractors neglect to clear the tunnel of smoke and gases.

DIVISION No. 2.

Shaft No. 5. North Heading.

January 19, 1886. The air is simply execrable, enough so as to prevent any watch of the roof. It is advisable to insist on better management of the ventilators and the use of a suitable electric light.

Shaft No. 5. South Heading.

January 19, 1886. The air is simply execrable, enough so as to prevent any watch of the roof. It is advisable to insist on better management of the ventilators.

Shaft No. 6. North Heading.

January 19, 1886. The natural ventilation is fair.

Shaft No. 6. South Heading.

January 19, 1886. The natural ventilation is fair.

Shaft No. 7. North Heading.

January 19, 1886. The air (and light) is simply execrable, enough so as to prevent any watch of the roof. It is advisable to insist on better management of the ventilators.

February 8, 1886. Temperature, floor foot of shaft, 50 degrees; temperature seven feet above floor foot of shaft, 50½ degrees; temperature floor B. M. No. 2, 53 degrees; temperature 7 feet above floor B. M. No. 2, 53½ degrees; temperature floor B. M. No. 3, 54 degrees; temperature 7 feet above floor B. M. No. 3, 54½ degrees; temperature floor B. M. No. 4, 54 degrees; temperature 7 feet above floor B. M. No. 4, 55 degrees; temperature at foot of bench, 55½ degrees; temperature at top of bench, 58 degrees; temperature at roof of heading, 60 degrees; temperature at roof fifty feet from shaft, 55½ degrees; temperature at inside ventilator intake (idle), 56 degrees.

Using 6 drills, 5 gasoline torches, 15 burners each; 2 mules, 34 men and 15 kerosene lamps and torches; temperature on top, 24 degrees; wind, 5 miles per hour, south west; powder used, 150 pounds each shaft.

Shaft No. 7. South Heading.

January 19, 1886. The air (and light) is simply execrable, enough so as to prevent any watch of the roof. It is advisable to insist on better management of the ventilators.

February 8, 1886. Temperature at floor B. M. No. 1, 50 degrees; temperature 7 feet above floor B. M., 51½ degrees; temperature. floor 300 feet, 52 degrees; temperature 7 feet above floor 300 feet, 53 degrees; temperature at floor 500 feet, 53 degrees; temperature 7 feet above floor 500 feet; 54 degrees; end of ventilator (intake) floor, 54 degrees; end of ventilator 7 feet above floor, 55 degrees; foot of bench, 54 degrees; top of bench, 56 degrees;

roof of heading, 59 degrees; in intake carrying 50 cubic yards per minute, 54 degrees; close to roof near shaft, 55½ degrees. Seven drills at work; 5 gasoline torches (15 burners each); 2 mules, 34 men about 15 kerosene lamps and torches; temperature on top, 24 degrees; wind, 5 miles per hour, south-west; powder used, about (not less than) 150 pounds per shaft.

Shaft No. 9. North Portal.

January 19, 1886, The air (and light) is simply execrable, enough so as to prevent any watch of the roof. It is desirable to insist on better management of the ventilators.

January 29, 1886. The tunnel this day was entirely filled with smoke, which was particularly thick about the middle of the tunnel for a distance of 600 feet. The ventilator had not been working since morning and they were adding to its length and moving the air jet.

Thermometric observations taken during the day: at floor (old portal), 50 degrees; at 6 feet above, 52 degrees; at foot of bench 58 degrees; at 6 feet above, 60 degrees; at 1 foot above bench floor, 62 degrees; at roof near heading, 66 degrees; out doors, 38 degrees.

February 13, 1886. No air boxes in north heading from station 477+05 to 470+59 on account of explosion on the eleventh.

South Portal No. 9.

January 19, 1886. The air (and light) is simply execrable, enough so as to prevent any watch of the roof. It is advisable to insist on better management of the ventilators.

January 29, 1886. Thermometric observations taken during the day: At floor 200 feet in 45 degrees; at bench floor, 58 degrees; in water, foot of bench, 55 degrees; at top of bench, 60 degrees; at floor of heading, 61 degrees; at roof of heading, 64 degrees; out doors, 38 degrees.

Anemometer test: Intake 12x21=1.75 feet area.

Speed of current (tried five minutes under full pressure), 2,028 feet per minute. Air taken at intake=131.4+cubic yards per minute. It is, therefore, evident that the ventilation is shockingly mismanaged. There is no discretion used in placing the intake according to the weather, and as a consequence the ventilation (at best a costly piece of clumsiness) goes mostly to waste. It takes out the cooler purer air from the floor of the tunnel, both that which is trying to flow in from outdoors and that which released by the drill, flows down over the crest of the bench, leaving the foul air and smoke overhead until they cool down enough and sink to the floor behind the intake, where they generally stay for good. If you could induce the contractor to raise the intake, by an elbow and perpendicular, to within two or three feet of the roof and turn on the jet just as they commence to blast, the ventilator will remove only the hot smoke and not the better air as it does now.

DIVISION No 3.

Shaft No. 10. *North Heading.*

January 7, 1886. The ventilator was not running and the air for 200 feet from the breast was very fair, but thence to the shaft very foul and foggy.

February 6, 1886. Ventilation bad.

February 13, 1886. Ventilation poor and unfit for instrumental work.

March 6, 1886. Ventilation very poor.

Shaft No. 10. *South Heading.*

January 7, 1886. The ventilator was not running and the air for 200 feet from the breast was very fair, but thence to the shaft very foul and foggy.

February 6, 1886. Ventilation bad.

February 13, 1886. Ventilation poor and unfit for instrumental work.

March 20, 1886. Ventilation very bad.

Shaft No. 11 *A.* *North Heading.*

January 8, 1886. The ventilator was not in use though the air in places was foul and foggy.

January 25, 1886. The ventilation does not amount to a respectable attempt.

February 6, 1886. Ventilation improved since increase in boiler power.

February 13, 1886. Ventilation improved since increase in boiler power.

Shaft No. 11 *B.* *South Heading.*

January 8, 1886. The ventilator was not in use though the air in places was foul and foggy.

February 10, 1886. Air very still and quite smoky on yesterday. The afternoon was quite warm (49 deg.) without wind and the air in the tunnel seemed to be stagnant and nearly of uniform temperature everywhere.

		7 feet above.	Roof.
At top of shaft........	49 degrees.		
On floor at foot of shaft.	47 degrees.		
On floor at station 652..	47 degrees.	47½ degrees.	
On floor at station 654..	48 degrees.	48 degrees.	
On floor at station 656..	48 degrees.	48½ degrees.	
On floor at station 658..	49½ degrees.	50 degrees.	50 degrees.
On floor at station 660..	49½ degrees.	50 degrees.	50 degrees.
On floor at station 662..	50 degrees.	50 degrees.	50½ degrees.
On floor at station 664..	50 degrees +	50½ degrees.	51 degrees.
On floor at station 666..	51 degrees.	52 degrees.	52 degrees. +
On floor at station 668..	51 degrees.	53 degrees.	53 degrees. +

February 6, 1886. Ventilation improved since increase in boiler power.

Shaft No. 12 *A. North Heading.*

January 9, 1886. Ventilation very good indeed.
January 21, 1886. Ventilation is good.

Shaft No. 12 *B. South Heading.*

January 9, 1886. Ventilation is very good indeed.
January 21, 1886. Ventilation is good.

DIVISION NO. 4.

Shaft No. 13. *North Heading.*

February 1, 1886. The ventilation could be improved by th blowers being used more continuously. Air outside, temperatur twenty degrees; in heading, sixty-four degress top; 100 feet from bench, fifty-six degrees bottom; 200 feet from bench, fifty-four degrees bottom; 400 feet from bench, fifty degrees bottom; foot o shaft, thirty degrees bottom.

Shaft No. 13. *South Heading.*

February 1, 1886. The ventilation could be improved by the blowers being used more continuously. Outside temperature, twenty degrees; in heading, sixty-four degrees at top; 100 feet from bench, fifty-six degrees at bottom; 200 feet from bench, fifty-four degrees at bottom; 400 feet from bench, fifty degrees at bottom; foot of shaft thirty degrees at bottom.

Shaft No. 14. *North Heading.*

February 3, 1886. Temperature in heading, sixty-two degrees; temperature 100 feet from heading, fifty-six degrees; temperature 200 feet from heading, fifty-two degrees; temperature at foot of shaft, forty-two degrees; outside air, thirty-one degrees.

South Portal No. 14 *A.*

February 3, 1886. Temperature in heading, sixty-two degrees; temperature 100 feet from heading, fifty-six degrees; temperature 200 feet from heading, fifty-two degrees; temperature at foot of shaft, forty-two degrees; outside air, thirty-cne degrees.

Shaft No. 15. *North Heading.*

February 8, 1886. Temperature in heading, sixty-five degrees; temperature 100 feet from heading, sixty degrees; temperature 200 feet from heading, fifty-four degrees; temperature 300 feet from heading, fifty degrees; temperature of outside air, twenty degrees.

February 10, 1886. The air in the the tunnel could be much improved by running the ventilation pipe nearer the heading and by a more continued use of the blower.

Shaft No. 15. South Heading.

February 8, 1886. Temperature in heading, sixty-five degrees; temperature 100 feet from heading, sixty degrees; temperature 200 feet from heading, fifty-four degrees; temperature 300 feet from heading, fifty degrees; temperature of outside air, twenty degrees.

February 10, 1886. The air in the tunnel could be much improved by running the ventilation pipe nearer the heading and by a more continued use of the blower.

Shaft No. 16. North Heading.

February 9, 1886. Temperature in heading, sixty-two degrees; temperature 100 feet from heading, fifty-eight degrees; temperature 200 feet from heading, fifty-two degrees; temperature 300 feet from heading, forty-eight degrees; temperature foot of shaft, forty-two degrees; temperature of outside air, thirty-degrees.

Shaft No. 16. South Heading.

February 9, 1886. Temperature in heading, sixty-two degrees; temperature ten feet from heading, fifty-eight degrees; temperature 200 feet from heading, fifty-two degrees; temperature 300 feet from heading, forty-eight degrees; temperature at foot of shaft, forty-two degrees; temperature of outside air, thirty degrees.

DIVISION NO. 5.

Shaft No. 17. North Heading.

February 10, 1886. Temperature in heading, 64 degrees; temperature 100 feet from heading, 60 degrees; temperature 200 feet from heading, 57 degrees; temperature 300 feet from heading, 50 degrees; temperature foot of shaft, 40 degrees; temperatnre of outside air, 31 degrees. The air is very good and free from smoke, as candles are used instead of torches.

Shaft No. 17. South Heading.

February 10, 1886. Temperature in the heading, 60 degrees; temperature 100 feet from heading, 56 degrees; temperature 200 feet from heading, 62 degrees; temperature 300 feet from heading, 46 degrees; temperature at foot of shaft, 40 degrees; temperature of outside air, 31 degrees. The air in the heading is very good and free from smoke, as candles are used instead of torches.

North Portal, No. 18.

February 15, 1886. Temperature in the heading, 60 degrees; temperature 100 feet from heading, 56 degrees; temperature 200 feet from heading, 54 degrees; temperature 300 feet from heading, 50 degrees; temperature 600 feet from heading, 44 degrees; temperature of outside air, 36 degrees. There are no means here of ventilating the tunnel. No blower or ventilating pipe now in use.

South Portal, Shaft 18 *B.*

There is not any artificial means of ventilation in this tunnel, and, as a rule, the air is generally good, from the fact that the portal in connection with the working shaft causes a draught that keeps the tunnel comparatively free from bad air after blasting.

The tunnel is so short and the charges of dynamite are very small, and from this fact there is very little smoke to create any bad air.

Only hand drills are used in the heading and on the bench, and they use charges which shake up large quantities of material owing to the loose nature of the rocks.

At the present rate of progress it is estimated that the north heading of 18½ will be reached by the fifteenth of May next, which will increase the ventilation in that tunnel.

South Portal, No. 18.

February 17, 1886. Temperature of outside air, 40 degrees; temperature in heading, 54 degrees; temperature 100 feet from heading, 50 degrees; temperature at foot of shaft 18½, 46 degrees. The air is good as very little powder is used and but little smoke is made.

Shaft No. 18½. *North Heading.*

February 17, 1886. Temperature in the heading, 60 degrees; temperature 100 feet from heading, 54 degrees; temperature 200 feet from heading, 50 degrees; temperature foot of shaft, 43 degrees; temperature of outside air, 40 degrees. The air is bad and very smoky, and the blower does not have the desired effect of driving out the foul air.

April 4, 1886. the ventilation is not in as good a state as it should be, but with the appliances now in use could be made to do the work, if it was put in proper order and the ventilating pipe run within fifty feet of the heading, and the connection joints made air tight with pitch and canvas. There is in use a No. 7 Sturtevant suction blower, and is a good one. Should the twelve-inch pipe be made tight and the blower run for about three hours after each blast there would be no trouble in having good air and good ventilation in headings instead of as at present, powder, smoke, foul air and noxious gases.

Shaft No. 18½. *South Heading.*

February 17, 1886. Temperature in the heading, 60 degrees; temperature 100 feet from heading, 54 degrees; temperature 200 feet from heading, 50 degrees; temperature at foot of shaft, 43 degrees; temperature of outside air, 40 degrees.

The air is bad and very smoky, and the blower does not have the desired effect of driving out the foul air.

April 4, 1886. The ventilation is not in as good a state as it should be, but with the appliances now in use could be made to do the work if it was put in proper order and the ventilating pipe run within fifty feet of the headings and the connecting joints made air-tight with pitch and canvas. There is in use a No. 7 Sturtevant suction blower, and is a good one. Should the twelve-inch pipe be made tight and the blower run for about three hours after each blast there would be no trouble in having good air and good ventilation in heading instead of as at present, powder, smoke, foul air and noxious gases.

Shaft No. 19. *North Heading.*

February 20, 1886. Temperature in the heading at roof, 62 degrees; four feet from bottom 100 feet from heading, 54 degrees; four feet from bottom 200 feet from heading, 50 degrees; four feet from bottom 200 feet from heading, 42 degrees; four feet from bottom 400 feet from heading, 38 degrees; outside air, 32 degrees.

The air in the tunnel is bad and very smoky for a long time after each blast, as the ventilation pipes are not near enough the heading and are used to force the smoke instead of drawing it out.

Shaft No. 19. *South Heading.*

February 20, 1886. (Same temperatures and same comments as in north heading.)

"C."

CORRESPONDENCE OF CHIEF ENGINEER ON VENTILATION.

NEW YORK, *February* 11, 1886.

Messrs. BROWN, HOWARD & Co., *Contractors:*

SIRS.— With a view to the safety of the works under my charge, I have to direct that you cause the magazines or powder-houses to be removed to such distance from the shafts that no danger will be done to the shafts or other works by the explosion of a powder-house. The magazine at shaft No. 5 is noted as frightfully near the shaft.

Your attention is also called to the dangerous practice which obtains on some parts of the work, of keeping dynamite in the tunnels. This is believed to be contrary to your orders. Henceforth it will be in disobedience of mine.

Respectfully yours,

(Signed) B. S. CHURCH,

Chief Engineer.

NEW YORK, *February* 13, 1886.

Messrs. BROWN, HOWARD & CO.:

GENTLEMEN.—I must also remind you that clause twenty-nine of the contract requires that tunnels must be kept so free from smoke and noxious gases that the engineers can establish alignments or do other engineering work efficiently. This matter is neglected to such a degree, that I must insist that you take immediate steps to secure better ventilation. Otherwise lines and grades will not be given, and any progress made without alignment will be at your own risk as to lines and grades.

Yours respectfully,

(Signed) B. S. CHURCH,
Chief Engineer.

NEW YORK, *March* 17, 1886.

BROWN, HOWARD & CO.:

SIRS.—I have to notify you that unsuccessful attempts were made on Sunday last to run lines at shaft No. 0, and shaft No. 4, and in both cases there was a lack of ventilation which put a stop to the work. No more lines can be given at shaft No. 0 until the tunnel has been so cleared that lines can be run from the outside, and no more lines can be given at shaft No. 4 under the present condition of the ventilating facilities unless perhaps there should be a long spell of cold weather.

Very truly yours,

(Signed) CHAS. S. GOWEN,
Div. Engineer.

NEW YORK, *March* 23, 1886.

B. S. CHURCH, Esq., *Chief Engineer:*

DEAR SIR.—I would beg to call your attention to the lack of ventilation at shafts 19 and 18½, and at North Portal, particularly the latter. At North Portal they are now in over 1,500 feet under cover, and no artificial ventilation whatever provided. At 19 they have blowers, imperfectly fitted and insufficiently run; at 18½ the same as at 19.

The condition of the atmosphere in the above workings is consequently very bad. At North Portal, as above stated, there is no artificial ventilation at all; and at 18½ and 19 the ventilating pipes are not carried near enough to the face; the joints are not made properly air-tight to prevent leakage, and the fans are not run for a sufficient length of time; by all of which circumstance section 29 of specifications as regards ventilation is, in my opinion, flagrantly violated; and I would beg you to consider the present letter as my official report to you of such violation. And I would beg to add,

that in my opinion, unless energetic steps are taken to coerce conformity to specifications in this respect no relief can be expected.

Very respectfully,

(Signed) E. SHERMAN GOULD,
Div. Engineer.

NEW YORK, *March* 24, 1886.

Mr. E. SHERMAN GOULD, *Div. Engineer:*

DEAR SIR.— Be pleased to report specifically if the appliances for ventilation in shafts 19, 18½ and North Portal are inefficient or inappropriate for securing the quality of work, or the rate of progress established by the specifications. And you will please notify the contractors, on such days in the immediate future as you may foresee it will be needed, to have the tunnels so free from smoke and noxious gases that you or your assistants can establish the alignment or do other engineering work efficiently. Report promptly their compliance or failure, or if steps are being taken, actively, to comply.

Very truly,

(Signed) WILLIAM R. HUTTON,
Con. & A. D. C. Engineer.

NEW YORK, *April* 3, 1886.

Messrs. BROWN, HOWARD & Co., *Contractors:*

GENTLEMEN — The air in your tunnels is so bad that the engineers cannot remain in them long enough to do accurate work. They are so dark, partly from smoke and moisture, and partly from inefficient lights, that it is not possible to examine the roof as to its safety. The headings are generally clear but the body of the tunnel is very foul. I must, therefore, require that on at least one day in each week, to be designated by the division engineer, you have your tunnels ventilated and clear so that proper work can be done. If the headings are kept clear and the roof inspected as work progresses this may be sufficient. At least nothing more will be required until this is found to be inefficient. As you have heretofore failed to comply with similar requests, this requirement will be enforced by withholding your estimates if necessary. As far as I am informed, a twenty-horse power boiler at each shaft, in addition to those now there, will probably keep your fans running sufficiently for practical purposes of the engineering corps. Your present steam power, however, is generally scarcely sufficient to maintain a proper rate of progress, and being hard worked, may fail at any moment, exposing both yourselves and the city to loss.

Yours very truly,

(Signed) B. S. CHURCH,
Chief Engineer.

NEW YORK, *April* 3, 1886.

Messrs. O'BRIEN & CLARK, *Contractors:*

GENTLEMEN — The ventilation and lighting of your tunnels from shafts Nos. 19, 18½ and North Portal are inefficient to secure the quality of work established by the specifications, or the rate of progress necessary to enable you to complete within the period prescribed in your contract. They are insufficient to enable the engineers to establish the alignment or do other necessary engineering work. Be pleased to correct these defects at once.

Very truly yours,

(Signed) B. S. CHURCH,
Chief Engineer.

"D."

SYNOPSIS OF ACCIDENTS IN OFFICE OF CHIEF ENGINEER.

Inlet Gate-house, Croton Lake.

February 2, 1886. One man fell into dump; hand cut, injured internally.

Large Gate-house, Croton Lake.

December 8, 1885. One non-fatal accident; laborer's foot crushed by stone that fell from a car.

January 18, 1886. One non-fatal accident; laborer's leg caught by a stone which started to roll and pinched him against another stone.

Shaft 0. *Slope at Croton Lake.*

September 26, 1885, 1 P. M. One fatal accident, two non-fatal; Assistant Engineer Morris killed; boarded a car not attached to the hoisting cable; car ran down the slope, collided with cars in tunnel and threw him out.

Coroner's verdict found the contractors indirectly responsible.

Shaft No. 1.

February 8, 1886. One non-fatal accident; Italian's leg broken by piece of rock that rolled from the bench to the floor of the tunnel.

Shaft No. 3.

November 28, 1885, midnight. Three fatal accidents; three miners killed going down in the bucket; the cross-head stuck in guides, then fell some ninety feet on to the thimble on the cable broke and knocked the men off.

Coroner's verdict, "unaccountable."

December 7, 1885. Five fatal accidents; five miners killed going down in the bucket; the cross-head fell and knocked them off.

January 13, 1886. One non-fatal accident; laborer injured while helping to move a cage.

February 2, 1886. Two non-fatal accidents; two men slightly hurt about the face and hands by their lamps igniting with gasoline from a lamp left in the tunnel during the blasting.

March 20, 1886. Two non-fatal accidents; one man slightly contused by a piece of falling rock; one man fell from a scaffold.

Shaft No. 4.

November 30, 1885, morning. Two non-fatal accidents; two men in tunnel; just after blasting a rock fell from face of heading while men were sending it.

December 8, 1885, 8:30 A. M. One fatal accident; man killed in south heading by fall of rock.

Shaft No. 5.

September 19, 1885, 10 A. M. One fatal accident; foreman, while placing the timber in the shaft, slipped and fell to the bottom, 124 feet.

Coroner's verdict, "purely accidental," exonerated contractors from all blame.

December 13, 1885. One non-fatal accident; a ditcher, aged 54, did not come out of tunnel when warned of a blast; it is thought he ran back for his coat; both legs broken.

Shaft No. 6.

October 9, 1885. One fatal accident; man fell from ascending bucket when not on duty.

Coroner's verdict, "his own negligence."

November 1, 1885, midnight. Two fatal accidents; two miners drilled into and fired an old hole supposed to have gone off.

Coroner's verdict, "accidental, no one to blame."

December 3, 1885. One non-fatal accident; mucker injured by breaking of a scaffolding.

December 9, 1885. Two non-fatal accidents; machinist and heading foreman while examining the air pipe it blew dust into their eyes.

December 17, 1885. One non-fatal accident; track layer, while guaging track, run into by a car which broke his leg.

January 29, 1886, 7 P. M. One non-fatal accident; mucker stepping off cage at bottom of shaft fell into cage pit.

Shaft No. 7.

September 18, 1885, 3:50 A. M. One fatal and two non-fatal accidents; men were ascending with tools on loaded car, contrary to orders; drills caught in "buntings" *i e.* (buntons).

Coroner's verdict, "through disobedience of orders in riding on a bucket containing tools;" contractors not censured.

December 3, 1885. One non-fatal accident; colored man discolored eye; hit by pick.

December 24, 1885. One fatal accident; Italian.

Coroner's verdict, "crushed between cage and buntons;" recommended that no men be allowed to hang up a drill in a cage with a loaded car and that drills brought up on empty cages be properly secured so that they will not move while in the cage.

March 20, 1886, 11:30 P. M. One non-fatal accident; dump man caught between two cars on dump; switch misplaced.

Shaft No. 9.

May 10, 1885, 11:35 P. M. Two fatal accidents; four non-fatal accidents; fired an old hole on bench at the heading; coroner's verdict, file 2, p. 7; in use.

November 5, 1885, noon. One non-fatal accident; gang-plank broke and he fell on to the invert.

January 15, 1886. One non-fatal accident; man fell from scaffold at bench in the south heading and broke his collar bone.

February 10, 1886, 9 P. M. One non-fatal accident; man was taking four boxes and five gallons of dynamite into the north heading; the car upset and lamp hung on it fired the contents of the car. Division engineer says it was the result of close management, but one powder man to two headings was overworked, from five A. M. to ten P. M.

Shaft No. 10.

November 16, 1885, 10 A. M. One non-fatal accident; chuckman's left leg broken by fall of rock from breast of tunnel while drilling. Division engineer blames foreman for allowing drills to start before loose rock was detached.

December 4, 1885. One non-fatal accident; Italian's leg broken by scaffold breaking.

March 26, 1886. One non-fatal accident; man ascending in a cage made sick by foul air when fifteen feet up shaft, fell off and broke his leg.

November 5, 1885. One non-fatal accident; man while setting drill in north heading hurt by a falling rock.

Shaft No. 12, *A*.

December 8, 1885. One non-fatal accident; man fell from scaffold while wheeling a barrow.

Shaft No. 12 *B*.

May 16, 1886. One non-fatal accident; loosening rock from side of tunnel; it fell and injured him.

Shaft No. 13.

October 6, 1885. One fatal accident; man killed trying to get on to a cage after it had started up the shaft; was caught by the timbers and crushed to death.

Shaft No. 14.

May 14, 1886, 2 A. M. One fatal accident; man killed by fall of loaded bucket starting up shaft. Construction engineer thought it the fault of a cheap engine-driver just employed.

September 25, 1885. One fatal accident; rock in north heading fell and killed a man.

September 28, 1885, 9 A. M. One non-fatal accident; at Saw-mill river, blow-off tray of rock, hoisting out of trench, bumped the trestle and dumped rock on to man.

September 29, 1885. One non-fatal accident; man's team ran away and threw him out of his wagon.

October 8, 1885. One fatal accident; engine driver at a derrick at main cut at Ashford stumbled and fell fifty feet down a shaft and was killed.

October 16, 1885. One non-fatal accident; laborer in gate house excavation; a derrick rope previously complained of by the division engineer broke and rock fell on the man's back.

October 28, 1885. Four non-fatal accidents; miners while starting to put a hole in a large mass of loose rock in side of tunnel next the bench brought the mass down upon them.

November 13, 1885. One non-fatal accident; while a man was lowering brick to the masons in the main trench the scales struck slope and detached a large boulder, which rolled down and crushed him.

December 14, 1885. One non-fatal accident; a barrel load of rock was dumped from the dumping platform on to a man and injured him.

Shaft No. 15.

September 15, 1885. One non-fatal accident; a man injured at Ardsley by very loose stones rattling down and lacerating his hand severely.

September 7, 1885. One non-fatal accident; man's forearm broken by fall of roof rock in tunnel.

October 15, 1885. One fatal accident; one non-fatal accident; by fall of rock in tunnel in north heading just after blast, two large pieces weighing four or five tons; division engineer thought no one to blame.

December 8, 1885. One non-fatal accident; laborer caught under a descending cage through his own carelessness.

Shaft No. 16.

May 4, 1886. One non-fatal accident; fingers torn off by being caught by a rope in a sheave.

October 15, 1885. One non-fatal accident; man fell from a wheeling plank.

February 15, 1886. One non-fatal accident; rock fell from breast of heading and broke his leg.

March 3, 1886. Three fatal accidents; three men while loading a blast fired off fifty pounds of powder not yet put in the holes.

March 24, 1886. One fatal accident; a fireman suddenly roused from his nap, stumbled into the belting and was whirled around twice and instantly killed.

Shaft No. 17.

January 27, 1886. Two non-fatal accidents; men were in center of tunnel 600 feet from where a blast went off and were peppered with stones.

Shaft No. 18.

September 18, 1885. 2 A. M. Two fatal accidents; at South Portal at Yonkers derrick rope three-fourths of an inch in diameter, steel, but much worn, broke and let car body fall upon them.

Shaft No. 18½.

December 13, 1885. One non-fatal accident; man crushed under cage at bottom of shaft.

February 2, 1886, midnight. One fatal accident; one non-fatal accident; powder boss and heading boss went into the thawing-house to eat their supper, and while there either the lamps or the stoves exploded two boxes of a hundred cartridges; result, one man missing and one man hurt.

Shaft No. 20.

October 29, 1885, 8 P. M. One fatal accident; man instantly killed by fall of roof rock.

October 5, 1885. One fatal accident; man trying to get off an ascending cage was crushed to death between the cage floor and the shaft timbers.

January 7, 1886, 8 P. M. Two non-fatal accidents; two colored brakemen thrown from a car descending the incline in the north heading; probably car struck a loose rock fallen from a previous car.

January 28, 1886. One non-fatal accident; laborer walking track was struck by a car running down the incline.

Shaft No. 21.

October 8, 1885. One fatal accident; mucker killed; fell off a rising cage, perhaps in a fit; found dead in the dump.

Shaft No. 22.

February 3, 1886, 2 A. M. One fatal and one non-fatal accident; a magazine on corner of the dumping grounds exploded; 200 pounds forcite powder in it; man missing afterward.

Shaft No. 23.

September 24, 1885. One non-fatal accident; foreman barred down a piece of rock that fell upon a man and hurt him.

Shaft No. 24.

November 16, 1885, 4 A. M. One non-fatal accident; man got his fingers cut off in an air valve he was fixing.

December 1, 1885, 7:30 A. M. One non-fatal accident; rock fell out from side of shaft twenty-five or thirty feet above bottom and hurt him.

REPORT ON AUBURN HIGH SCHOOL.

ALBANY, N. Y., *October* 18, 1886.

To the Secretary of the State Board of Health:

SIR.— Under your direction and in accordance with the request of the board of health of Auburn, N. Y., I visited the city of Auburn, N. Y., October 11, 1886, and during that and the three following days made a thorough examination of the sanitary condition of the site selected by the board of education for a new high school, and a somewhat limited examination of the sewerage of the city, and I have now the honor of submitting on the above subjects the following:

REPORT.

1. *High School Site.*

Upon reference to plate III it will be observed that the site selected lies near the edge of an old cedar swamp. There are no surface indications of the swamp; indeed this part of the city is densely built over, but, in digging the trenches for the foundation walls, the mucky, carbonaceous strata characteristic of an ancient swamp were encountered, and, it seems, gave rise to considerable alarm. As nearly as I could understand the danger feared was that the black strata represented vegetable material still in a state of decomposition, the product being in part, at least, gaseous, and finally that the gases thus generated would be confined within the foundation walls and compelled to escape through the rooms of the building, thus subjecting pupils and teachers and the members and officials of the board of education to whatever toxic, or in other ways injurious, influences might be inherent in the gas. After careful study of the structure and environment of the site, I am unable to concur with these apprehensions. Before giving in detail the reasons for non-concurrence, it is proper to state that in my opinion the site is an unfortunate one, for in a matter of such importance as this no feature should require defense; on the contrary the burden of proof of error should be upon the opposition. In the absence of modifying circumstances it would be an easy matter to convict the board of education of having erred in locating the building in this particular place; but it so happens that there are circumstances that strongly modify and to a considerable extent restrict the selection of a building place. I shall refer to but one — the principal; the lot upon which the old high school stands was given to the board of education of the city of Auburn upon the condition that a school of academic grade should be maintained upon it, and, furthermore, that whenever the board of education should cease to maintain upon the ground a school of academic grade, that then, and as a consequence of such failure, the

land should revert to the original donors. The board deemed it necessary to retain this ground and the buildings on it, and were consequently obliged to select land adjoining in order that the new building should be, in part at least, on the land included in the gift so that the letter of the law might be observed. My authority for these matters of legal fact is Mr. Commissioner Kerr of the board of education.

To return, now, to the question of the sanitary condition of the site. Plate 1 is a vertical section from the surface to the bottom of the foundation. The upper stratum of made ground is entirely unobjectionable, a mixture of clay and loam and wholly free from rubbish. It appears to be made up of material obtained by digging out cellars. The third layer, marked in drawing "dark filling," as also the fourth layer, "light filling" differs from the first in color only. Number 5 is a bed of ashes of very small extent and free from garbage. Number 6 is an extremely thin discontinuous layer of moderately hard and dry vegetable matter, of about the color of chocolate, having a peaty odor. The muck, or peat, is far from pure — probably fifty per cent by volume being loam. Number seven is a mixture of clay, loam and small lenticular pieces of shale. The stratum is not continuous and is probably filling. Numbers 9 and 11 are almost jet black, not quite as hard as clay, charged with moisture, exhaling a strong peaty odor and, when dug out from some little distance and immediately tested, a faint odor of sulphuretted hydrogen. This material when thrown upon the bank and left exposed emitted a very disagreeable, almost putrid odor. It is proper to state that the specimens of Nos. 9 and 11 were obtained from localities very near an old, disused sewer (to which reference will shortly be made) and the unfavorable odors obtained may be due to infiltration of sewage in time past. Number 10 appears to be an alluvial deposit. Numbers 2, 8 and 12 present nothing of special interest. As far as the section indicates, the only strata capable of exerting an unfavorable influence are the three numbered 6, 9 and 11, and of these No. 6 may be thrown out as being too thin and of too small superficial extent to be considered, besides being almost dry. Nos. 9 and 11 give evidence of being wholly inert *in situ* which is the condition, of course, in which they are to be considered, since what is disturbed is to be removed. But suppose, for the sake of argument, there be an evolution of gas from these layers, the quantity evolved will not be affected by the construction of the building, and the only effect produced by the structure will be to afford a channel of escape up along the foundation walls, since the clay strata prevent any general upward motion, and in passing up along the walls a series of ground water drains will be encountered and nearer the surface a series of sewer pipes along the sides of which any evolved gases would pass with much less resistance than through the water tight floor which will extend, according to specifications, from wall to

wall. However, in my opinion, there is no good reason to apprehend the evolution of gas in anything but infinitesimal quantities.

Reference to Plate 11 shows that a sewer runs across the site, diagonally near the front wall. This sewer is very old, almost totally disused, square in section, measuring about two feet six inches on the side (interior) with dry stone side walls and flag top. The existence of this sewer is an argument of considerable force against the site, still it is far from constituting a fatal objection. After a careful examination of the portion uncovered I am satisfied that by removing the sewer itself with six feet on each side and one foot beneath (yellow clay) all contamination will be removed.

Still another objection to the site is the high level of the ground water. The building will be less than 300 feet (estimated) from Owasco river; the finished cellar bottom will be 7.08 feet above the normal level of the water in that river and but four feet six inches above the flood level (in spring). This condition can be remedied only by the removal of the "prison dam," a matter that will be referred to in the second part of this report.

From a study of the plans and specifications of the proposed high school building I am prepared to say that the appliances for heating and ventilation are complete and altogether admirable. I am not at present acquainted with any other school that, in these matters, would serve as well as this one as a model for future structures. And I have to say the same regarding the lavatory and drainage apparatus. All this, of course, supposes that the work will be executed as planned and specified. With the lighting I am not as well satisfied; the principal story is almost wholly occupied with recitation rooms, of which four are, of course, corner rooms, and these are amply lighted, the proportion of glass surface to floor surface being 1 : 4.6, but the inner rooms have but one square foot of glass to 9.8 square feet of floor. The second story is occupied by two large study halls; the proportion between glass and floor is 1 : 6.8. These defects are easily remedied at this stage, requiring merely alterations in drawings. I recommend that the Board of Education be advised to request their architect to so amend the plans as to secure for each recitation room and study hall not less than one square foot of actual glass area for every five square feet of floor surface.

2. *Sewerage.*

Auburn is a city that became large enough to require sewers before engineers knew how to build and connect them. House drains were turned into the nearest water-course, or brook, until by the multiplication of this act the brook became simply an open sewer and an evident nuisance, when it was walled up on each side with stone laid without mortar or cement and covered with flat stones. In later times, circular brick sewers have been built in various parts of the city, as emergency required, until at present

there are several miles of sewers in operation. There is no systematic arrangement, each sewer being independent of all others. Storm water is admitted through corner gullies into all the sewers. Finally, all sewers, with two or three exceptions, discharge into the Owasco river, the outlet of Owasco lake, a small stream flowing through the heart of the city.

The Auburn sewers, then, may be divided into three groups as follows, viz.:

First. Natural open water-courses; of these there are in use but few, perhaps three or four, not including the Owasco river.

Second. Sewers having a rectangular section; some of these are derived from the first class, others are wholly artificial, having plank bottoms, uncemented stone sides and flat stone tops.

Third. Brick sewers circular in section. Sewers of the first class are objectionable at all times from their tendency to deposit filth along the edges, and this objection is intensified by the fact that streams running through built-up regions change their level considerably and rapidly under the influence of storms, and in consequence submerge a more or less wide strip on each side above the normal level, and upon subsidence leave these strips covered with deposits, which exposed to the sun and air may become dangerous to health.

Sewers of the second class are thoroughly bad. Their section is decidedly favorable to the formation of deposits due to the retarding influence of friction in the angles, and in consequence such sewers require cleaning out more frequently than others of better design. The open joints of the sides permit of the freest leakage until the adjacent and subjacent soil is so thoroughly saturated with water as to become practically impervious. This pollution of the soil is a matter of great gravity, for wells located in the neighborhood of the sewer must of necessity be rendered unsafe for drinking purposes; and another danger to be apprehended lies in the impregnation of the ground air with the products of decomposition of the organic matter escaping from the sewers, and also with the bacterial germs that inevitably live and multiply in presence of a decomposing organic nidus-germs that may be and probably for the most part are of a perfectly harmless variety like the bacterium termo of ordinary putrefaction, but which may be of some pathogenic form.

Sewers of the third class are objectionable by reason of their section, unless the volume of sewage is sufficient to keep them constantly, at least half full — a condition that does not prevail in the sewers that I examined. The flatness of the curve of the invert causes the normal or dry weather sewage to spread over too much surface to carry along the solid or semi-solid materials — that is in the case of a sewer large enough to carry storm water.

Sewers built as described above are not only objectionable on sanitary grounds but they are very much more expensive to main-

tain than when properly designed, and even considerably more expensive in first cost if compared with a complete system.

The time at my disposal at Auburn for studying its sewerage matters was too limited to allow me to gather all the data required for detailed specification of a satisfactory system, but it was sufficient to determine generally what ought to be and could be done; and I offer the following remarks as embodying the general features of a practicable

SYSTEM OF SEWERAGE.

First. Small vitrified tile sewers (starting in every case with diameter of 5") running through center of streets on all summits, or elevated streets and connecting with secondary sewers. (Par. 3) All storm water to be rigorously excluded from these primary sewers.

Second. All storm water falling on summits to be conveyed by gravity in street gutters (which may require to be deepened for the purpose) until secondary sewers (Par. 3) are reached.

Third. Secondary sewers of brick, egg shaped in section, cutting contour lines at a very sharp angle, or, in other words, running around summits at a distance from the summit dependent upon the slope, being nearer for a slight slope. For any hill there may be required one, two or even three secondary sewers, depending upon the extent. All storm water collected on the same and higher levels to be discharged into these sewers through gullies at the corners. (See Par. 10.)

Fourth. Main sewers of brick, egg shaped in section, to connect the secondary sewers with one or other of two intercepting sewers, running one on each side of the Owasco river. (See Par. 5). One main will be required for each secondary, or set of secondary sewers. These sewers will take the most direct route to the river. They will receive storm water along their course the same as the secondary sewers.

Fifth. Two intercepting sewers, one on each side of the Owasco river will be required. These to be of brick, egg shaped in section, extending from points within the city to be determined by proper survey to some points below the inhabited part of the corporation. These sewers to be of sufficient capacity to carry (together) a rain fall of one-half inch in one hour, in addition to a sewage of fifty gallons per capita in twelve hours. Openings will be provided at suitable points through which storm water in excess of that indicated above may be dischared directly into the Owasco river.

Sixth. Small sewers, as described in paragraph 1 to be used in all streets not occupied by the secondary, main or intercepting sewers.

Seventh. House drains, or sewers, to be connected with the sewer in the street.

Eighth. In building the sewers a connection to be supplied opposite every lot. In case of pipe sewers this connection should

be a Y branch, and in case of brick sewers a single length of vitrified pipe built in somewhat above the center of the large sewer and at a horizontal inclination of forty-five degrees. These connections should be thoroughly closed with wooden plugs luted with clay until required for use.

Ninth. A man hole should be constructed at every junction of two sewers, and at every change of direction. This man hole should be large enough for a man to enter for the purpose of removing obstructions, should such occur. By having one at every change of direction it is easy, by using lights, to examine every part of the sewers (except during storms) and by the use of rods made up of short joints to remove obstacles. (This applies more to the sewers that are too small to admit a man.)

Each man hole will have an iron grating in the cover to serve the purpose of ventilating the sewers. Plate IV shows the man hole in plan and section.

Tenth. Corner gullies will be required along the secondary main and intercepting sewers. They should be constructed of masonry. I am disposed to think it an advantage to have a clear water way from the entrance to the sewer, that is with neither silt basin nor trap. The connection with sewer should be near the top and curved in the direction of flow. Not every corner will need a gully — the number will depend on the slope of the streets.

Eleventh. Flush tanks (automatic) may be required at the dead ends of some of the lines of small pipe sewers. This can only be determined after surveys.

In connection with such a system of sewerage as described above a law should be enacted by the Common Council, and rigidly enforced, compelling all persons owning property along line of completed sewers to make connection with same and to remove thoroughly all privies on the said property together with contents of vaults or pits.

THE OWASCO RIVER OR OUTLET.

The Owasco river is the outlet of Owasco lake, the source of the city's water supply, and flows through the city in a generally south-westerly course, dividing the corporation into approximately equal parts. Ten dams thrown across the river within the city limits furnish water power during a part of the time to a number of manufacturing establishments, although one of these dams that formerly furnished the motor power for the prison shops is not used at present, and consequently performs no useful work. All of the sewers of the city discharge directly into the river; the mills along its course empty their waters, spent dye, etc., into the streams, and, finally, a double row of privies built partly over the water add their quota of pollution to this already black, filthy, stinking stream which flows through the midst of the city with a mean

velocity (at time of inspection) of about six inches per second. The bottom and sides of the river are thickly covered with deposited filth, wide stretches of which are exposed whenever (every Saturday) the water is drawn off from the dams.

The execution of the sewerage works described above will, of course, at once relieve the stream from pollution within the city limits, but will not affect the insanitary conditions resulting from the deposited filth.

To satisfactorily deal with this river, it will be necessary, in my opinion, to carry out the following works, viz:

First. Remove the prison dam and subjacent rock (if any be found) to a level 6.9 feet below lip of dam at central point.

Second. Construct a stone revetment or retaining wall on each side from the prison dam (No. 7) to dam No. 8. This revetment to be built with batter slope of 1: 1; the walls to be parallel and at such a distance apart as may be found necessary to accommodate the maximum freshet.

Third. Secure an approximately uniform depth corresponding to what now prevails opposite the shoe manufactory near State street.

Fourth. Above dam No. 8 and below dam No. 7, construct dykes by piling, or earth work protected by rip-rap, as circumstances may require, wherever the land adjacent to the stream is drowned.

The effect of these operations will be to somewhat increase the velocity of the river; to prevent formation of deposits of any kind and to reclaim certain areas of land on each side of the river; thus, between No. 8 dam and the railroad bridge, a strip of about ten feet in width would be at the disposal of the city, or the abutting owners, as the case may be, while from the railroad bridge to the prison dam, a very wide strip — fifty to 100 feet — would be reclaimed. Aside from the prison dam, these works will in nowise affect the water power afforded by the several dams.

In the event of the city authorities being unwilling to undertake the whole of this work at once, it will be well to understand that parts of the same may be constructed independently of the rest and without prejudice to the success of the system as a whole. That which requires the most immediate attention is the construction of the intercepting sewers, but as a preliminary to that, and indeed to all the work, a complete sewer survey should be made of the city, and from this all questions of dimensions of sewers will be determined, after which the building of the intercepting sewers, the removal of the prison dam and the construction of the revetments should be undertaken and carried to completion. Then as new sewers are built let them be in continuance of the system and a part thereof.

SEWAGE DISPOSAL.

After the sewage has been collected by the intercepting sewers, it may be disposed of in one of three ways, as follows, viz: *First.* Direct discharge into Owasco river. *Second.* Discharge by irrigation upon a sewage farm. *Third.* Chemical and mechanical treatment.

1. *Direct Discharge into River.*

This is the simplest method of sewage disposal and is attended with no expense whatever, but it is in the last degree unsatisfactory.

Upon ethical grounds it is certainly improper for any town or city to pollute a stream that flows past or through other towns or cities below it. Upon sanitary grounds it is a decidedly dangerous practice, since besides the offensive odor or appearance of the water it is likely to be charged with, or at least to contain, morbific germs, which if taken into the system by drinking the water may there develop into serious or fatal disease.

The typhoid epidemic at Plymouth, Pa., is a well known example of the point in question. Another substantial objection to this method of sewage disposal is this: Deposits of filth will form below the outfall of so tenacious a character that the spring freshets will be unable, wholly, to remove them, and then, too, the gases of decomposition given off from these deposits will quickly kill fish and other animals inhabiting the river. Much has been said and written concerning the oxidizing power of running water, but the most that can be said of the conclusions is that oxidation in any considerable degree is not proven, and at any rate no effect whatever is produced upon pathogenic bacteria. If the volume of sewage discharged into a stream be very small as compared with the volume of the stream, then by natural dilution the sewage will appear to be destroyed — the quantity of sewage per gallon of water taken from the stream diminishing as the distance from the outfall increases, but ever more and more slowly until a point is reached beyond which no change in the chemical character of the water can be observed; this amounts to saying that the sewage rapidly diffuses at first, and then more slowly, until throughout the stream the quantity of sewage per gallon, expressed as a percentage, is the same as the percentage of the flow of sewage from the outfall to the flow of the river at the outfall. The only argument in favor of this method of sewage disposal is its cheapness.

2. *Irrigation on Sewage Farm.*

The object of this process is twofold: To dispose of the sewage nd to utilite its fertilizing properties. To this end the sewage is onducted to a farm of sufficient area — about one acre to 200 of opulation — lying nearly level. From the mouth of the interpting sewer a number of trenches called "carriers" are extended a level, as nearly as possible, over the farm so as to divide it

into approximately equal strips. Secondary, and it may be tertiary systems of trenches are connected with the carriers, still farther subdividing the land into strips varying in width from forty feet in the case of loamy and gravelly soils to eighty feet in case of clay soils. The strips require to slope from the trench on each side to a furrow in the center, the slope being 1 : 20 for loam and gravel and 1 : 40 for clay. The whole strip is to be cultivated—preferably for garden truck. By means of movable dams, shaped like and about as large again as a common spade, the flow of sewage in the secondary trenches is controlled, the general custom being to irrigate every alternate strip for one or two days, and then to turn the stream on the other strips for an equal period of time. A simple system of sub-drainage is required to prevent saturation of the soil, and the effluent may be turned directly into the river without fear of pollution.

In practically carrying out such a system as just described, it is better for the corporation to purchase the necessary land and then to rent the land to market gardeners. A sewage farm will not in general command as high a rental as other land, because the sewage must be received constantly, and this is of course an obstacle to the preparation of the land for crops. In winter all dams are removed and the sewage allowed to flow continuously over all parts of the farm. No trouble has been experienced in other places of the latitude of central New York in the winter disposal of sewage by irrigation.

The following table compiled by S. M. Gray, city engineer of Providence, R. I., gives the amount of land in use in several European cities:

TOWN.	Population.	Dry weather sewage per diem.	No. of acres.	Population per acre.	Gallons sewage per acre.	Soil.
Bedford	22,000	1,000,000	155	142	6,451	Porous.
Breslau	300,000	7,707,500	741	400	10,397	Porous.
Croydon	65,000	4,707,000	450	144	10,444	Porous.
Dantzic	100,000	3,063,700	395	250	7,749	Porous.
Doncaster	24,000	600,000	200	120	3,000	Porous.
Leamington	26,000	800,000	375	69	2,133	Porous.
Oxford	41,000	1,250,000	318	128	3,931	Porous.
Warwick	12,000	1,000,000	130	92	7,692	Clay.

3. *Chemical and Mechanical Treatments.*

There are several methods of treating sewage with chemicals, some of which are patented and others free to the public. I shall mention but one method in this report, for the reason that the others are either not sufficiently tested or else are too expensive in their application. The method to be described has been adopted by the city of Providence, R. I., and consists in adding to the sewage a "mixture of crude sulphate of ammonia, proto sulphate of iron (copperas, or green vitriol) and lime." After mixing, the sewage is run

into a precipitating tank capable of holding a storm discharge of twenty-four hours, and when filled is allowed to rest for nearly a day, or while a second tank is filling. The clear supernatant fluid is then drawn off and turned into the river, after which the sludge or precipitated material is forced from the tanks into a press which squeezes out nearly all the water and leaves a solid inodorous cake which may be sold as manure.

The estimated cost of the Providence precipitation works, with a population of 300,000 is $629,512.00, hence for Auburn, with a probable population of 30,000, the estimated cost would be $62,950, or say $63,000.

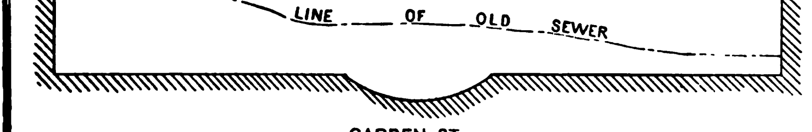
I have not at my command the necessary data to decide between the second and third methods of sewage disposal at Auburn but, other things being equal, am strongly in favor of the method by irrigation. That is to say, if the necessary quantity of land and of suitable kind can be purchased for a reasonable price, and not too far below the city, then the best interests of the corporation will be subserved by adopting this method of intermittent downward filtration by irrigation with cultivation of the land.

I recommend that the common council of Auburn be advised to enact a series of plumbing regulations governing the sizes of materials used for soil pipes, waste pipes, house sewers, etc., as being necessary to the satisfactory and economical maintenance of the sewer system.

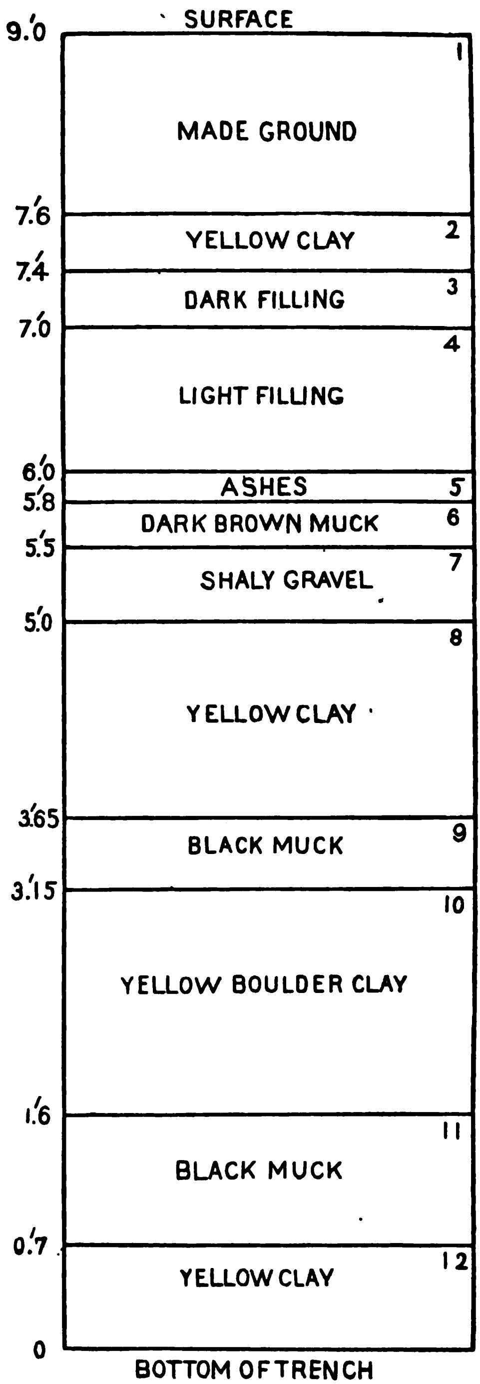
All of which is respectfully submitted,

RICHARD PRESCOTT,
Sanitary Engineer.

478 Broadway, Albany, N. Y.



PLAN SHOWING RELATION OF ABANDONED SEWER TO HIGH SCHOOL SITE


SURFACE
9.′0
1
MADE GROUND
7.′6
YELLOW CLAY
2
7.′4
DARK FILLING
3
7.′0
4
LIGHT FILLING
6.′0
ASHES
5
5.′8
DARK BROWN MUCK
6
5.′5
7
SHALY GRAVEL
5.′0
8
YELLOW CLAY
3.′65
BLACK MUCK
9
3.′15
10
YELLOW BOULDER CLAY
1.′6
11
BLACK MUCK
0.′7
YELLOW CLAY
12
0
BOTTOM OF TRENCH

REPORT ON THE PURITY OF ICE FROM ONONDAGA LAKE, THE ERIE CANAL AT SYRACUSE AND FROM CAZENOVIA LAKE.

To LEWIS BALCH, M. D., *Secretary of the State Board of Health:*

SIR — The question of the purity of the ice of Onondaga lake having been referred to me, I took occasion at the meeting of the sanitary committee at Syracuse, on December eighth, to have a hearing of all parties interested in the matter. Ice for the use of Syracuse is furnished by several parties. Messrs. Sawmiller, Knapp, Listman, Gee Brothers and others, are among the ice dealers.

Ice for city use is cut from Onondaga, Oneida, Cazenovia and Cayuga and other lakes and from several points on the Erie canal.

It appears that the city board of health, on the recommendation f Dr. Englehardt, forbade Messrs. Sawmiller Bros., from selling, r purposes where it comes in direct contact with food or drink, ice cut from Onondaga lake. This firm complained that such ion was unjust, as the ice sold by them was pure and no more ject to sanitary condemnation than much of the other ice sold he city.

he request for an examination of the subject by the State rd of Health comes from the city board of health of Syracuse. d already made personal examination of the sanitary condition nost of the waters flowing into the south-east end of Onondaga . Such additional knowledge as was needed I obtained from esses at the hearing on December eighth. The principal stream ring Onondaga lake in the city of Syracuse is Onondaga creek which flow all the principal sewers of the city. An examination e condition of this stream proves that its waters are very grossly ted. Bear Trap creek, another important affluent of the lake, obably comparatively pure.

nondaga is a small but deep lake. A large proportion of its r is derived from Onondaga creek. The ice of the lake being from water polluted with sewage is, therefore, open to cion; but no positive judgment could be made of the *degree* ollution of the ice without a series of analyses of samples from the lake at properly selected points, and analyses of les of the water from the points where the ice was cut were ecessary.

therefore, advised that the committee recommend the city of health of Syracuse to have a specimen of ice cut at the where Onondaga creek enters the lake, another specimen ousand feet north of this point, another two thousand feet west of the last point, and two more specimens within

the next mile in a north-westerly direction, and that specimens of the water of the lake be taken at the points where the ice was cut.

In partial accordance with these recommendations specimens of ice and water were taken from three points in Onondaga lake, one in the wide water of the canal at the foot of Cherry street, and the other in the center of Cazenovia lake, 300 feet from the east shore and in thirty feet of water.

These specimens of ice and water have been analyzed by Professor Willis G. Tucker of Albany, one of the analysts of the State Board of Health and a biological examination made by Dr. Wm. Hailes.

Before attempting to discuss these results it will be necessary to settle, if possible, certain general questions concerning the relations of impure ice to health.

RELATIONS OF IMPURE ICE TO HEALTH.

There is a popular impression that water in freezing purifies itself; and for this reason many streams and ponds throughout the country are used for cutting ice for domestic supply that would be considered unfit for furnishing wholesome drinking water. The first question, therefore, that arises in connection with this matter, in the minds of the people, is this: Can ice from contaminated water cause sickness? This is best answered by reference to the experience of competent observers.

The European records, from which so much of sanitary knowledge is drawn, are silent on this point because ice has there been so little used, and because the ice supply of that region is largely brought from America and the far north. In the United States the attention of the medical profession seems not to have been directed to impure ice as a possible source of disease until 1875, when a mild but well marked epidemic occurred at Rye Beach, N. H., which was very thoroughly investigated by Dr. A. H. Nichols of Boston, and the results fully reported to the State Board of Health of Massachusetts. The proof was unusually conclusive that the epidemic disturbance of the digestive organs was due to ice cut from a shallow pond containing a large amount of decomposing organic matter. In appendix "A" will be found the full report of this case, which is remarkable alike for being the first one on record, the most complete in its investigation, and the most conclusive in its proof that ice frozen from polluted water may cause disease.

In the American Journal of Medical Science, January, 1878, Dr. C. Smart, Assistant Surgeon, U. S. A., published the results of a most interesting investigation on "Mountain Fever and Malarious Water," in which he traced the origin of mountain fever to the melting snow water in the Rocky Mountain streams and inferred that the germs of this typho-malarial fever were brought down from the atmosphere by the snow, and, remaining frozen during the winter, passed into the streams with the melting snows in May, June and early July.

79 an epidemic dysentery occurred in the village of Wash- Conn., which was investigated by Dr. Orlando Brown field, and Dr. J. H. Raymond of Brooklyn. The ice used persons attacked was from a small and much polluted stream. alysis of the ice itself showed it to be grossly contaminated. er origin being found for the epidemic, which was limited who used the impure ice, the ice was pronounced to be ise of the dysentery. The case as reported by the State of Health of Connecticut is given in Appendix "B."

e Report of the Connecticut Board for 1882 an isolated case oid is reported where a private ice supply was cut from a hich had received through a drain the dejecta of a typhoid The details as reported are given in appendix "C."

pendix "D" is given a quotation from the Report of the ticut State Board of Health for 1880, stating that several cases of enteric trouble and one death were reported that year as due to free use of sewage polluted ice.

epidemic of typhoid fever at Plymouth, Penn., in the spring 5, was investigated by many competent experts, and the d conclusion was that the epidemic was caused by the of a typhoid patient being thrown out upon the snow near ık of a reservoir, from which part of the town is supplied ater. The germs of the disease remained frozen until the thaw, when, with the melting snow, they passed into the ir.

pendix "E" I have brought together quotations from a of recognized authorities which show that the best sanitary ties in this country are now convinced that ice from d water has caused disease.

ough the cases quoted above vary very much in the com- ss of the proof that impure ice caused the disease in ques- et after a careful review of all the facts reported, and opinions of experts, it must be concluded that *ice from d water has been the cause of disease*, varying in intensity ild disturbances of the digestive organs to fatal dysentery phoid fever.

hen, ice may be the carrier of disease, the next important n to be considered is:

HAT EXTENT DOES WATER IN FREEZING FREE ITSELF OF IMPURITIES?

First as to Chemical Impurities.

the purpose of determining to what extent water in freez- es itself from dissolved organic matter, Dr. C. P. Pengra, of Michigan, made in 1882 a series of experiments with various ns of crystalloids and colloids. The solutions of urea, grape and arsenic in freezing were purified of from forty to fifty-

five per cent of the organic matter. The ice from solutions of albumen was purified of twenty per cent of the organic matter in the water.

Experiments by Prof. S. P. Sharples, of Boston, in 1879, on the water and ice from three ponds, and one much polluted pond hole near a slaughter-house, show the ice from the ponds to have contained from seventeen to forty per cent of the "free and albuminoid ammonia," found in the water from which it was frozen, while the ice from the much polluted pond hole had only eight per cent of the organic impurity of the water. The details of these investigations are given in appendix "F."

In the case of Rye Beach, the water from the contaminated ice, when analyzed after filtering, so as to measure only the organic matter in *solution*, contained of "free ammonia .0231, while the water from the pond contained .0197. Of "albuminoid ammonia" the amounts were .0165 and .0597. From this it would appear that the ice contained twenty-five per cent of the *dissolved* organic impurities of the *water*, but this is somewhat uncertain as the ice was cut from the pond in winter and the water for analysis was taken the following summer.

In the case of the Pittsfield ice supply, given in appendix "E," the pond water seems to have contained of "free ammonia" about .020, and the ice from it .007. Of "albuminoid ammonia," the water .015 and the ice .0013. All of the fractions here given denote parts per 100,000.

The table of analysis of Onondaga lake waters and ice hereafter given shows approximately the following results:

Onondaga Lake.

	Free ammonia in parts per 100,000.	Albuminoid ammonia.
Water	.0252	.011
Ice	.0032	.001
Percentage of organic impurity retained in ice	12 per cent.	10 per cent.

The analyses of water and ice from the canal show that the ice contains about twenty per cent of the dissolved organic impurity of the water, and from Cazenovia lake the ice retains about twenty-one per cent of the dissolved organic matter in the water.

These facts prove conclusively that water in freezing frees itself of only a part of the organic matter dissolved in it; and that *ice may contain from ten to eighty per cent of organic impurities in solution* in the water from which it was frozen.

IMPURITIES IN SUSPENSION IN WATER.

Besides the organic matter dissolved in water it may conta very large amount of organic matter in *suspension*.

In the Rye Beach case it appeared that only about twenty p cent of the impurities in the ice had been in solution in the wat Four times as much suspended organic matter had been caught the ice in freezing. Before filtering, the water from the ice c tained of albuminoid ammonia .0704, and only .0165 after filterin

In Appendix "G" is quoted from the Report of the State Boa of Health of New Hampshire for 1882, an account of the polluti of the water and ice of the Ammonoosuc river, for twenty mi below the tanneries and glove factories of Littleton. Ice cut t miles below Littleton contain so much hair and so many partic of flesh, that in melting a large cake of it, an intolerable odor wou be produced. Hair was visible in the stream twenty miles bel the tanneries.

Ice may, therefore, be grossly polluted by organic matter floati in the water from which it was frozen.

PURIFICATION FROM LIVING ORGANISMS.

Chemical analysis can determine only a part of the impurities ice or water. The micro-organisms which swarm in pollut waters can be detected only by the expert biologist working wi the microscope. While many of these organisms are harmless health, others are endowed with powers terribly destructive to li Some six or seven of the zymotic diseases, and possibly consum tion, have been proven to be caused by various species of bacter living plants, whose minute spores may float by myriads in or water, invisible except through the higher powers of the mic scope, and undiscoverable by chemical analysis. Their powers self-multiplication are so great that they may increase a million fo in a few hours.

Koch's researches have shown that the bacillus which produc Asiatic cholera, thrives in water under favorable conditions a multiplies itself in untold numbers. English sanitary observe have long held as the result of their experience that water was t great carrier of cholera and typhoid fever. Experience in th country has been the same. In both Europe and America the are many cases on record to show that an extremely small quanti of the dejecta of a typhoid or cholera patient may infuse the pois through millions of gallons of water, and spread pestilence throu a community. There is every reason to suppose that this probal power in minute quantities of typhoid and cholera poison to fatal pollute comparatively large bodies of water is due to the action living organism, multiplying itself under favorable conditio with marvelous rapidity. That they do not always so multiply due to conditions of which little is understood. Sometimes it

probable that one class of bacteria destroys another. Sometimes the proper food and temperature for the development of the plants are not present. The disease-producing germs are known to exist in great numbers in the excreta of persons suffering from a specific disorder. Hence it is that sewage is believed to be so dangerous a menace to any water supply. In every city there are many patients suffering from infectious diseases, the specific germs of which must pass into the sewers, where heat, moisture, darkness and the presence of ammonia, furnish conditions, under which most bacteria thrive. When these pathogenic germs are carried out into a stream or lake, they may either remain dormant, be destroyed, or, under peculiar and favorable conditions, they may multiply enormously and render the water extremely dangerous for drinking. Experience has shown that a sewage contaminated water supply usually comparatively harmless, may suddenly, owing to some unknownchange of conditions, become the carrier of the seeds of a fatal epidemic.

For this reason all water known or liable to contain the specifice germs of disease is now considered unfit for potable purposes if a better can be had. This conclusion has been recognized by the law-making power of the State and a statute enacted to "Protect Public Water Supplies from Sewage Pollution."

Regarding ice, the question then arises, does water in freezing free itself from living organisms, and will such organisms if frozen into ice have their vitality destroyed?

The experiments of Dr. C. H. Pengra, given in Appendix "H," show that under the conditions which he produced in his laboratory, the ice contained ten per cent of the living organisms which occurred in the water from which the ice was frozen.

In the same Appendix will be found Prof. Leidy's account of his finding in ice, used for domestic purposes, "worms, immature anguillulas, and a number of rotifer vulgaria, *all living.*"

Prof. Kendrick, of Glasgow, made a number of experiments to determine whether solutions could be sterilized by freezing. "The organic fluids were exposed to temperatures more than 120 degrees below 0 deg. F., but on thawing they were found to contain living organisms still."

Ice, therefore, is proven to contain a considerable percentage of the bacteria which were in the water from which it was frozen, and the vitality of many of these organisms is not destroyed by the process of freezing.

CONCLUSIONS RESPECTING ICE POLLUTION.

The facts above given warrant, it is believed, the following conclusions:

First. Ice frozen from impure water has caused illness.

Second. Ice may contain from eight to ten per cent of the organic matter *dissolved* in the water from which it was frozen.

Third. Ice may contain, in addition to the dissolved impurities, a very large amount of organic matter which had been *suspended* or floating in the water before freezing.

Fourth. Ice may contain living animals and plants from the size of visible worms down to the minutest spores of bacteria and the vitality of these organisms be unaffected by freezing.

THE ICE OF ONONDAGA LAKE, THE ERIE CANAL AT SYRACUSE, AND CAZENOVIA LAKE.

Onondaga Creek.

The city of Syracuse is situated at the south-east end of Onondaga lake, which extends to the north-west nearly five miles. The breadth of the lake is from one-half to three-quarters of a mile. At a short distance from the shore the lake is quite deep at the south-west end. The great body of the water in this upper end of the lake comes from Onondaga creek, a large stream which enters near the south-east corner. The course of the creek for the last three miles is through the city of Syracuse, where all the sewers empty into it. The flow of the stream is probably from ten to twenty-five million gallons per diem, and its fall through the city about one foot per thousand. In examining the banks of the creek December 9, 1884, I observed that so much sewage was then poured into the stream that deposits of filth were forming on its banks and in its channels. The slight fall and reduced summer flow render the current sluggish and incapable of carrying away the greater part of the solids that come down with the sewage. They are, therefore, deposited on the bottom and sides of the creek. Several causes are acting to make the stream fluctuate. This rise and fall of the water tends to alternately spread the sewage over the banks and shallows of the channel, and then, with the subsidence of the water, to expose it to the action of the sun and air.

At the time of my inspection there was a margin of from one to four feet wide of black, putrefying organic matter exposed along the shores. At places the organic matter in the bed of the creek is undergoing rapid decomposition and giving off the gases of putrefaction which rise in bubbles to the surface.

Probably 5,000,000 gallons of sewage are daily poured into Onondaga creek, which, in time of low water, is liable to have a flow of not over 10,000,000 gallons per diem. The whole flow of the stream is thus converted into dilute sewage, from which the heavier matter is deposited when the current is sluggish, while the remainder flows a mile below into Onondaga lake. In time of flood a part of the decomposing filth of the channel is scoured out and carried down into the lake there to be deposited and continue the process of putrefaction. Probably two-thirds of the water of the upper half of the lake flows in from this open sewer of Onondaga creek.

Water Analyses.

In the following tables are given the analyses of specimens of ice and water taken from the same spot at the same time for the sake of comparison. They were taken by an officer of the city board of health from points where ice was being cut for the several dealers named, as is certified by the affidavit given in appendix "I." In appendix "J" is given the report of Dr. Willis G. Tucker, the chemical analyst.

Specimen No. 3 was taken about 1,500 feet from the mouth of Onondaga creek and 1,200 feet from the shore; No. 1 was taken 3,000 feet from the mouth of the creek and 1,200 feet from the shore; No. 2 is from a point two miles from the mouth of the creek and 600 feet from the shore.

It may be said, with reference to the biological examination, that the method used of adding some of the water to be tested to sterilized gelatine and noting the time when, owing to the development of bacteria, the gelatine begins to liquefy and the extent of the liquefaction on different days, does not give a true measure of the number of micro-organisms in water, for of the forty-nine species of bacteria described by Dr. James Eisberg in his Bakteriologische Diagnostik, only fifteen species liquefy gelatine. Among those which do not liquefy gelatine is the organism which is supposed to be the cause of typhoid fever. The liquefaction method, while it is sufficiently accurate for determining approximately the relative numbers of bacteria in the water and ice, is not a measure of the absolute number. The results indicated by it would, however, be too small rather than too large.

As regards the large amount of chlorine shown by the chemical analyses, it is due principally to the water of the salt wells which runs into the lake.

TABLE I.

Analyses of Syracuse waters and ice, March 20, 1886. Results, parts per 100,000.

DESCRIPTION OF SAMPLE.	Color and appearance.	Odor at 100 deg. Fah.	Chlorine in chlorides.	Free ammonia.	Albuminoid ammonia.	Total solid residue.	Loss on ignition.	Mineral matter.	Oxygen absorbed at 80 deg. Fah. In 15 min.	Oxygen absorbed at 80 deg. Fah. In 4 hours.	Conclusions.
Sawmiller, Onondaga Lake water, No. 1	Light brownish green, slightly turbid; very slight sediment	Slight	24.50	0.0336	0.0095	86.00	20.00	66.00	0.1093	0.2133	Bad.
Listman, Onondaga Lake water, No. 2	Brownish green tint; slightly turbid; slight flocculent sediment.	Slightly disagreeable.	17.80	0.0210	0.0150	66.50	15.50	51.00	0.1693	0.2080	Bad.
Gee Bros., Onondaga Lake water, No. 3	Greenish tint; slight flocculent sediment	Slight	23.60	0.0320	0.0095	85 00	18.50	66.50	0.0853	0.1866	Bad.
Knapp, Wide Waters Erie canal, No. 4	Yellowish tint; slight sediment	Slight	0.74	0.0160	0.0080	49.00	14.00	35.00	0.1066	0.2000	Bad.
Listman, Cazenovia Lake water, No. 5	Greenish tint; slight sediment	Slight; peculiar	0.24	0.0047	0.0070	14 50	7.00	7.50	0.0933	0.2133	Doubtful.
Sawmiller, Onondaga Lake ice, No. 1	Very light greenish tint; very slight sediment.	Slightly disagreeable	0.18	0.0020	0.0010	2.00	1.40	0 60	0.0133	0.0586	Good.
Listman, Onondaga Lake ice, No. 2	Very light greenish tint; very slight sediment	Slightly disagreeable.	0.24	0.0053	0.0010	1.80	1.40	0.40	0.0160	0.0400	Not completely satisfactory.
Gee Bros., Onondaga Lake ice, No. 3	Very light greenish tint; very slight sediment	Slight	0.20	0 0027	0.0010	1.20	0.80	0 40	0.0240	0.0466	Good.
Knapp, Wide Waters, Erie canal (ice) No. 4	Very light greenish tint; very slight sediment	Slight	0.15	0.0033	0 0015	1.10	0.80	0.30	0.0213	0.0480	Good.
Listman, Cazenovia Lake ice, No. 5	Very light bluish green tint; no sediment	Slight	0.18	0.0018	0.0010	1.20	0.90	0.30	0.0106	0.0266	Good.

WILLIS G. TUCKER, *Public Analyst.*

TABLE II.

REPORT OF BIOLOGICAL EXAMINATION, PATHOLOGICAL LABORATORY, ALBANY MEDICAL COLLEGE.

Secretary State Board of Health:

DEAR SIR. — Upon biological analysis of samples of waters and ices sent from Syracuse, N. Y., I would report as follows:

LOCALITY.	Date of culture.	Time of first appearance of micro-organisms.	Time of beginning of liquefaction of gelatine.	Extent of liquefaction of gelatine.	Observations, etc.
No. 1, water ...	March 9 March 22	1¼ days...	2¼ days...	2½ inch... 8 days.	Bacteria exceedingly numerous and destructive of gelatine — (bad).
No. 1, ice	March 9 March 22	1¼ days...	2¼ days...	2 inch... 8 days.	Destructive of gelatine. Organisms very numerous — (bad).
No. 2, water ...	March 9 March 22	1¼ days...	2¼ days...	1⅛ inch... 8 days.	Organisms very numerous — (bad).
No. 2, ice	March 9 March 22	1¼ days...	2¼ days...	1⅛ inch... 8 days.	Organisms very numerous, freezing delays destruction, develope slowly.
No. 3, water ...	March 9 March 22	1¼ days...	2¼ days...	1¾ inch... 8 days.	Organisms very numerous.
No. 3, ice	March 9 March 22	1¼ days...	2¼ days...	1 inch. . 8 days.	Organisms very numerous but very small, and develope slowly.
No. 4, water ...	March 9 March 22	1½ days...	2½ days...	1 inch.. 8 days.	Organisms numerous and small.
No. 4, ice	March 9 March 22	1½ days...	2½ days. .	1 inch .... 8 days.	Organisms numerous and small.
No. 5, water . .	March 9 March 22	1½ days...	2½ days...	¾ inch .. 8 days.	Numerous organisms, large and small.
No. 5, ice	March 9 March 22	1½ days...	2½ days...	½ inch.... 8 days.	Numerous organisms, large and small, but develope slowly.

All the above samples of water and ice, show the presence of bacteria in great abundance; freezing does not destroy or remove them, but retards their growth somewhat. Biologically considered, all the above samples would be ranked as unsafe waters for potable purposes.

WM. HAILES, M. D.

The chemical analyses above given show that the waters from each point in Onondaga lake are polluted as well as that from the canal. The following are the amounts of free and albuminoid ammonia in the lake samples arranged according to their nearness to the mouth of Onondaga creek.

	Free Ammonia.	Albuminoid Ammonia.
No. 3. 1,500 feet from creek	.032	.0095
No. 1. 3,000 feet from creek	.0226	.0095
No. 2. 10,000 feet from creek	.021	.0150

There seems little to choose between them on chemical grounds. They are all polluted, and from the sanitary survey above reported the polluting matter is known to be largely sewage.

The analyses of the ice show that the ice of Onondaga lake contains probably from ten to twelve per cent of the sewage impurities dissolved in the same quantity of unfrozen water of the lake. Arranged in the order of nearness to Onondaga creek the ice samples stand as follows:

	Free Ammonia.	Albuminoid Ammonia.
No. 3. 1,500 feet from creek	.0027	.0010
No. 1. 3,000 feet from creek	.0020	.0010
No. 2. 10,000 feet from creek	.0053	.0010

There is little to choose between them on chemical grounds, although that most distant from the creek has the largest amount of free ammonia.

While the ice has freed itself from ninety per cent of the soluble filth of the water from which it was frozen, ten per cent of the dissolved sewage is retained in the ice. The ice of the whole lake is, probably, to that extent sewage polluted.

But it contains, also, matter far more dangerous than that in solution and detectable by chemical analysis. The biological examination shows the presence of bacteria in great abundance in the water and in the ice. Here, again, there is so little to choose between the various samples that Dr. Hailes pronounces them all as unsafe for potable purposes.

It is by some contended that wholesome waters may contain large numbers of bacteria. This is probably true, because many species of bacteria are harmless. But where great numbers of bacteria are found in waters coming from a source known to supply large quantities of disease-producing or pathogenic species or their spores, then the presence of numerous micro-organisms is strongly indicative of danger.

CONCLUSIONS.

From such clear and positive evidence but one conclusion can be reached. Onondaga lake is contaminated with sewage, and this contamination will continue to increase. The water contains numerous bacteria or their spores. The sewers of Syracuse are bringing down into the lake great numbers of these micro-organisms. Among them is a varying percentage of pathogenic germs. The ice of the lake in freezing takes up a portion of the bacteria brought down by the sewers. It, therefore, doubtless contains its proportion of the disease-producing germs from the Syracuse sewers This cannot but be harmful to some susceptible persons at all times, while under certain unknown conditions they may rapidly multiply or increase in virulence and spread disease and death throughout the community.

The danger from Onondaga ice is certainly real and increasing. Syracuse can obtain an ample supply of ice of unquestioned purity from other points within reach of the city. I am, therefore, of the opinion that the ice from Onondaga lake should not be used for any purposes where it is liable to come in contact with food or drink.

WIDE WATER OF ERIE CANAL AT SYRACUSE.

Chemical analysis shows the water of the canal to be impure, and from inspection, the impurities are known to be from human rather than from natural sources. The canal ice contains some twenty per cent of the organic impurity of the water from which it was frozen. Both water and ice contain numerous bacteria or their spores. As better can be had there seems no good reason why this ice should be used for potable purposes.

CAZENOVIA LAKE.

Chemical analysis shows the water of Cazenovia lake to contain less than half the "free and albuminoid ammonia" in the canal and only one-third of that in Onondaga lake. While both the ice and water of the lake are shown to contain numerous bacteria, there is no evidence submitted to me to prove that these bacteria or spores are from dangerous sources.

There does not, therefore, in my judgment appear to be sufficient evidence to condemn the use of ice from Cazenovia lake.

Respectfully submitted,

JAMES T. GARDINER.

Consulting Engineer.

APPENDIX "A."

REPORT ON AN OUTBREAK OF INTESTINAL DISORDER, ATTRIBUTABLE TO THE CONTAMINATION OF DRINKING WATER BY MEANS OF IMPURE ICE.

BY A. H. NICHOLS, M. D., OF BOSTON.

Rye Beach is an attractive and popular seaside resort upon the coast of New Hampshire, about fifteen miles distant from the north-eastern corner of Massachusetts; during the months of July and August of each year it is thronged with visitors from the large cities.

At the beginning of the season of 1875, there broke out among the guests of one of the large hotels of this place a somewhat extensive, though comparatively mild, epidemic. Being the only practicing physician in the vicinity, I was requested by the proprietors of the hotel to make a detailed investigation as to the causes of the disorder. The results of this examination revealed a novel and commonly unsuspected source of contamination of drinking water, and they have, therefore, seemed to me worth communicating to the Board of Health. The disorder in question may be comprehended under the general term disturbance of the digestive system, characterized by a sensation of giddiness and nausea, vomiting, diarrhœa, severe abdominal pain, all of which was accompanied by fever, loss of appetite, continued indigestion and mental depression. The epidemic, although confined within very limited boundaries, baffled for a considerable time all efforts to trace the trouble to any specific cause; while the *origo mali*, when ultimately detected, proved to be contained in an article of ordinary consumption, usually considered as above suspicion as regards innocuousness. The first few cases coming under observation did not attract particular attention, inasmuch as the symptoms manifested did not differ essentially from those noticed among the visitors in previous years, and induced by drinking the well water of the place, which, especially when the wells are low, is strongly impregnated with sulphate of lime, carbonate of lime and magnesia. It very soon became apparent, however, that the trouble was limited to the inmates of a single hotel, accommodating about 300 guests, whereas the occupants of another public house, containing rooms for about 200, and distant but one-eighth of a mile, were enjoying an absolute immunity from all illness; nor was any similar trouble known among the neighboring cottages, containing at least 500 visitors.

This particular grouping of the patients rendered it, therefore, tolerably certain that the whole disorder must be referred to some specific, local origin, to be sought for in the immediate vicinity of

the hotel; and popular opinion pointed very strongly, from the outset, to the drinking water. This was drawn from several wells, all sunk in an elevated ridge, and safely removed from drains, cess-pools, dung heaps, or other source of pollution. It was also ascertained, upon inquiry, that in some instances those persons affected, having apprehended trouble from the use of the water, had carefully limited themselves since their arrival to other beverages, but, as afterwards transpired, had not hesitated to use ice, either melted or otherwise.

With respect to the drainage of the house, it appeared that during the previous winter the services of competent engineers from Boston had been secured, under whose supervision an elaborate and complete system of sewerage had been recently constructed, by means of which all the discharge from the various sinks and water-closets was conveyed directly into the ocean. The point of discharge of this sewer was at a safe distance from the house, while the sewer itself was securely trapped and ventilated in such a manner as to preclude the idea of the escape of any foul gas within the house.

Attention was next directed toward the cooking utensils, but all the articles pertaining to the kitchen were found to be scrupulously clean, nor did it appear that any agent or utensil was employed in the preparation of the food which would in any way tend to produce the symptoms complained of. Furthermore, the milk supply was investigated and found to be of unquestionable purity.

The process of elimination was in this manner continued, until at length suspicion became directed to the supply of ice furnished to the house. It may be mentioned at this point that a large portion of the ice consumed in this town is gathered from shallow ponds formed during the winter by the flooding of meadows, and, therefore, contains, as a rule, more or less grass and other vegetable matter, and is consequently far less transparent than the article commonly supplied in our large cities. I was not particularly surprised then to find that the ice in this case was rather impure and opaque, and that it contained numerous foreign substances varying in size, and apparently of vegetable origin.

The theory that the outbreak, now increasing in extent and severity, was dependent upon the ice supply, was suddenly strengthened by some pretty direct evidence, of which the following examples may be given:

First. A resident of the place, upon being questioned upon the subject, volunteered the testimony that during the previous winter he had taken home some ice from the same pond where the ice supply of the hotel was obtained, and having consumed a portion with the view of testing it, had experienced nausea and distress for the remainder of the day, which led him to decide that it was unfit for use.

Second. Several persons affirmed that they detected a decidedly ıgreeable odor emanating from the ice as it melted.

Third. Two gentlemen having taken a quantity of ice with them ›n an excursion, and drank the water formed from it, were made lently ill.

Fourth. The atmosphere of the house in which the suspected ice ı stored was found to be decidedly offensive.

Fifth. When some of the melted ice water was poured into a ss, and held in front of a dark-colored object, a strong light king the glass from one side, it was found to be decidedly dis- ›red, and charged with suspended matter.

A visit was now made to the pond, and the condition of things here nd removed all doubt as to the exceptional foulness of the water n which the ice was formed.

This pond is a flooded marsh, of irregular outlines, about two- ·ds of a mile in length, and varying in width from 200 to 800 ;, with a uniform depth of about two feet. The source of the er supply was a small brook entering the lower end of the pond nging down all the saw-dust from two neighboring saw-mills), several springs said to be situated at the upper end. There formerly existed an artificial channel, by means of which was intained a direct communication between the pond and the an ; but for the past two years this channel had been filled up h sand and stones thrown up during heavy storms by the action the sea, which drives in here with extreme violence. Of late, refore, the water of the pond has become practically stagnant, ıough a small quantity constantly percolates a bank of gravel arating the pond from the ocean.

A glance at the lower end of the pond was sufficient to demon- ıte the source of the foulness of the water, for at this point, a ce of about 500 long and 150 feet wide, directly in front of the uth of the brook, was occupied by a homogeneous mass of rescent matter, composed of *marsh mud* and *decomposing saw- t.* The water in the vicinity of this bank was discolored, black, when stirred up emitted an intolerably offensive odor. Several e houses are situated at no great distance from this end of the d, the occupants of which, upon being questioned, asserted that n the water was stirred up by the rowing of boats, or ruffled wind blowing in the direction of the houses, the air was not equently polluted to such an extent as to render it necessary to the windows. Of course, there could be no question but that foul matter held in suspension in the water was conveyed by ents and winds to every part of the pond, and in sufficient tity to render the water in every part absolutely unfit for king purposes.

order to obtain further evidence as to the admixture of this matter with the ice, a quantity of the ice having been cleansed ı all surface impurities was placed in a tub to melt, and the

water thus obtained was poured into a fresh demijohn, sealed and forwarded for analysis to Prof. W. R. Nichols, who reported as follows:

"The water contains in suspension a considerable quantity of vegetable matter, more or less decayed, and possesses a slightly disagreeable odor, which becomes more evident if the water is warmed.

"Of the organic matter which is suspended in the water, and which may be removed by filtration, a portion, consisting of the larger and heavier particles, settled somewhat readily. Another portion, being more finely divided, remains for an indefinite time diffused through the water, and would be drunk by any one using the ice in the ordinary way.

"I do not think it unreasonable to suppose that the presence of this decaying organic matter may have been instrumental in bringing about the unpleasant results you have observed."

A sample of water was likewise taken for examination from the pond in question. This sample was obtained from the central portion of the pond, in the early morning, when no air was stirring, and the water being quite calm and undisturbed by undercurrents, the greater portion of any matter held in suspension would at that time be precipitated to the bottom of the pond. Consequently, the sample taken would represent the purest water obtainable from the pond under any circumstances.

The numerical results of these analyses are herewith appended. For the purpose of affording a means of comparison, there are also presented the results of analyses of a sample of ice supplied by the Boston Ice Company, and of the Cochituate water.

The subjoined sketch of the pond (drawn by Edward K. Clark, C. E.), will serve to convey an idea of the general outline and character of the pond, the location and relative extent of the bank of saw-dust and marsh mud by which the water was fouled, and the portion of the pond from which the ice was taken.

The proprietors of the hotel, impelled by a proper sense of the responsibility resting upon them, rendered willing assistance in ferreting out the source of the trouble, and as soon as suspicion was directed towards the ice, its further use was promptly prohibited. Coincident with this disuse of the ice, there was observed an abrupt amelioration in the symptoms of nearly all who had hitherto been ill, while during the remainder of the season, no fresh cases of this character are known to have occurred.

The evidence thus collected seems to render it almost certain that the illness in question was induced by the consumption of ice contaminated by decomposed organic matter.

As to the actual or relative number of those made ill in this manner, no exact estimate can be made, for the symptoms were, as a rule, not sufficiently severe to necessitate the aid of a physician.

As an approximate estimate of the extent of the mischief produced, it may be said in round numbers that the ice was consumed

in variable quantities during a period of six weeks by 500 individuals. Of these, twenty-six adults were known to manifest grave, continued, and characteristic symptoms. A large number, probably the majority, of the guests drank the contaminated water with apparent impunity. In some, although decided illness was induced during the first two or three days after their arrival, an habituation to the water seemed to be afterwards acquired, and they enjoyed a subsequent immunity from all trouble. In the case of several, on the other hand, the stomach seemed to resent with ever-increasing emphasis the presence of the foul water, nor was relief obtained until after the patients had quit the place. Thus many who had come from a long distance with the hope of strengthening and improving their physical condition returned home depressed, and without even having preserved the health they previously had.

It is worthy of remark, that no person under the age of ten was known to be affected by the impure ice.

Great responsibility devolves upon those who undertake to provide food and drink for large numbers of individuals, and to such the above experience inculcates the importance of giving especial attention to the purity of the drinking water, and guarding against every possible source of contamination.

The notion that ice purifies itself by the process of freezing is not based upon trustworthy scientific observation. On the contrary, it is utterly wrong in principle to take ice for consumption from any pond the water of which is so fouled as to be unfit for drinking purposes.

NUMERICAL RESULTS OF ANALYSIS.

COMPONENT PARTS.	ICE TAKEN FROM CONTAMINATED POND AT RYE BEACH.*				ICE SUPPLIED BY BOSTON ICE COMPANY. †	
	Results expressed in parts per 100,000.		Results expressed in grains to U. S. gallon.		Results expressed in parts per 100,000.	Results expressed in grains to U. S. gal.
	Unfiltered.	Filtered.	Unfiltered.	Filtered.	Unfiltered.	Filtered.
Ammonia	0.0208	0.0218	0.0121	0.0124	0.0045	0.0026
Albuminoid ammonia	0.0704	0.0165	0.0410	0.0096	....	....
Organic matter	7.80	6.88	4.55	4.01	0.45	0.26
Mineral and volatile matter	5.72	2.84	3.33	1.66	0.31	0.18
Total solid residue at 212° Fahrenheit	13.52	9.72	7.88	5.67	0.76	0.44
Chlorine	... .	3.23	....	1.88	Trace less than 0.02	Less than 0.012
Oxygen required to oxidize organic matter ‡	....	0.334	......	0.495	0.033	0.019

* Small amount of nitrates. † Trifling amount of suspended matter.
‡ Determined by permanganate of potash.

NUMERICAL RESULTS OF ANALYSES — (*Continued*).

COMPONENT PARTS.	WATER TAKEN FROM A POND AT RYE BEACH.*		Cochituate water. Mean of a number of determinations. Results expressed in grains to U. S. gallon.
	Results expressed in parts per 100,000.	Results expressed in grains to U. S. gallon.	
Ammonia	0.0197	0.0115	0.0020
Albuminoid ammonia	0.0597	0.0348	0.0068
Inorganic matter	64.96	37.88	1.61
Organic and volatile matter	8.00	4.66	1.22
Total solid residue at 212 deg. Fahrenheit	72.96	42.54	2.83
Chlorine	34.00	19.83	0.18
Equivalent to chloride of sodium	56.03	32.68	....
Oxygen required to oxidize organic matter	1.28	0.75	....

* Residue blackens strongly when heated. Evidently a large amount of organic matter.

(Extract from Seventh Annual Report of the State Board of Health of Massachusetts, January, 1876, from page 467 to 474 inclusive.)

APPENDIX "B."

SICKNESS FROM IMPURE ICE.

The following data are very kindly furnished by Dr. Orlando Brown, of Washington, Litchfield county, under whose care the greater number of these cases were. The subject is a very important one, and all clear instances should be recorded, to prevent similar occurrences.

The town of Washington possesses the usual topographical features peculiar to Litchfield county, with, perhaps, less swamp land and stagnant water than the towns in the immediate vicinity. Thus far it has enjoyed complete immunity from malarial diseases, which is indeed the case with all but one or two towns in the county. There has been no epidemic form of disease of any kind for several years past.

The local conditions of the case are as follows:

The house is situated in a little valley among the highest hills of the region. The occupants were farming people of intelligence, the head of the family quite prominent in the public affairs of the town.

The family consisted of the man and his wife, aged, respectively, fifty-one and forty-six; the wife's mother, aged sixty-nine; two children — a boy of twelve and a girl of fourteen years — a laborer employed on the farm, and a woman employed to do general housework. There had been no sickness in the family previous to August 6, 1879. The boy was then attacked apparently

with a mild form of dysentery. There had been during the summer, in different parts of the town, here and there, a few cases of dysentery, otherwise no unusual prevalence of intestinal diseases. The dejections were frequent, of bloody mucous, without fecal matter, tenesmus was marked, temperature never rose above 100, pulse about 104. August seventh, the father became similarly affected, the dejections presenting the general appearance of beef brine. August twelfth the daughter was attacked, being seized with a chill followed by a temperature of 105 degrees, pulse, 130–140, nausea and vomiting. August twelfth, the grandmother was also affected, the onset similar to that of the girl.

Collapse came on as suddenly and as markedly as in Asiatic cholera. The girl died on the fifth day after seizure, the grandmother on the seventh, the boy on the ninth. The father, after a slow and tedious convalescence, recovered.

The mother and house-servant had persistent diarrhœa, controlled with difficulty, but no dysentery. The farm laborer was early frightened, and left the town. No report of this illness was ever received.

The man that took his place went home at the end of a week, sick with dysentery, but recovered in about ten days. No cases occurred in his family or neighbors.

A sister of the wife that came to assist in the care of the sick was seized with dysentery, but recovered after six weeks' severe illness. Her children were ordered removed, but the two youngest, that were constantly with their mother during the day before removal, were attacked on the same day with a mild form of dysentery.

The cause was evidently local, the type of the disease, once established, mildly contagious.

The following facts as to the cause are obtained from the report of Dr. Raymond of Brooklyn, N. Y.:

Examination of the spring used to obtain drinking water excluded that as a possible source of the disease. The surroundings of the spring were unquestionably good, and analysis of the water as received in the house showed it to be of exceptional purity. The window curtain was examined for arsenic, but no trace of mineral coloring matter found.

The cellar was very damp, and the soil beneath and immediately adjoining the house, damp from the free water supply brought into the house from the spring — five pints per minute. In case of heavy rains, water runs into the cellar through the rear wall. How much this water is contaminated from the privy vault is not easily estimated. The vault had not been emptied for twelve years, and was far from being full, hence there must have been considerable soil saturation, as the privy was constantly used.

The stream from which the ice suspected was gathered runs through a field along side the road. This field has for fifteen years

been used as a running place for pigs, and swine were wallowing in the stream at the time it was examined.

The ice water on analysis showed:

Free ammonia, parts per million	.08
Albuminoid ammonia, parts per million	.09

The water was of a greenish color, with light colored organic particles in suspension. The stream also, apparently, receives drainage from house waste, and possibly sewage from the privy-vault before mentioned. The analysis and general character of the ice water show sufficient cause for the production of the symptoms described. The ice-water at Rye Beach contained considerably less ammonia.

Albuminoid ammonia is a reliable indication of contamination when excessive. When accompanied with but little free ammonia, and no evidence of chlorine, its presence indicates vegetable decay, the products of which contaminate the water. When the albuminoid ammonia amounts to five one hundreth parts per million, the quantity of free ammonia that accompanies it must be considered in estimating the amount of contamination.* A large percentage of albuminoid ammonia may exist, ten one-hundredths per million even, if there be no free ammonia present. The presence of the chlorides indicates contamination from animal decay, when present with the forms of ammonia. Taken together, the large percentage of both free and albuminoid ammonia in the ice-water proves the excessive contamination of the water from which the ice was collected. (Taken from the second annual report of the State Board of Health of the State of Connecticut, for the fiscal year ending November 31, 1879. Pages 90 to 92, inclusive.)

APPENDIX C.

* * * Freezing is a form of crystallization, and the general rules apply so far as inorganic pollution is in question. Ice frozen from water holding in solution mineral salts, will contain less of these than the water from which it was frozen, and by repeatedly dissolving in distilled water and refreezing, nearly all inorganic impurities can in time be removed from the ice. But in case of *organic* pollution, the reverse is true. Often the process of freezing may, and does, concentrate such impurities so that the ice contains more in a given weight than the water from which it was frozen. This was shown by the experiments of the committee of the National Board of Health. * * * * * *

The difference in specific gravity of ice and water probably is one reason for the excess of pollution in the ice. Such portions of

*Wanklyn Water Analysis.

the sewage as were lighter than the heavier water below the film of forming ice would naturally float to the surface and become entangled in the ice. From the results of some incomplete experiments of my own in this direction, it appears that the amount of dilution of the sewage, and the distance from the point of entrance, perhaps also the oxidation or partial destruction of the portions readily decomposed, are important factors in determining the relative amounts of pollution in ice and water. In specimens taken from a badly polluted stream near the outlet of a large trunk sewer, there were several grains more (1½) of organic residue from the ice than from the water of the river, while half a mile below the ice contained almost exactly the same amount of organic residue as the water. Similar results were obtained from ice cut from a pond four miles below the city, which sewers into the river of which the pond is a part. The pond results from a dam across the river.

The following experiment shows that the germs of bacteria are not destroyed by freezing or boiling, or both. After the sewage-polluted ice was melted, while evaporating to secure the solid residue, a condenser was attached and the water received in a Florence flask, which had been carefully washed in boiling water. The space between the tube of the condenser and the neck of the flask were filled with cotton wool to exclude the germs of the air as far as possible. When the flask was half full it was placed over a lamp and the water boiled, the neck sealed with cotton wool until the water boiled freely. The flask, after the water had been thoroughly boiled, was sealed and placed in a warm room. In two weeks bright spots appeared, and soon the whole became turbid. Microscopic examination then showed the presence of bacteria and bacillus rods. Ice cut from the center of a block which was cut from a sewage-polluted pond was placed in sterilized infusions by Prof. Pumpelly, and the flasks sealed. The development of bacteria showed that the vitality of their germs had not been destroyed by freezing.

There is another point to be considered in relation to the amount of contamination in ice from water polluted by sewage. As all chemical changes are less in winter under the influence of cold, the water from which the ice is formed would contain more sewage pollution in a given bulk than in summer, because less would be removed by oxidation and still less by vegetation, so that the ice would probably contain a greater percentage of sewage pollution than the water in summer. The microscopic life is also very considerably lessened in winter, so that source of purification of the water would be removed. The cold would also have a tendency to prevent rapid changes in the sewage itself, so these products would accumulate. Thus it is readily seen that if such water is unfit to be used as a source of drinking water in summer, it is unfit for a source of ice supply in winter. * * * * *

The effect of freezing upon the infective power of germs has not been fully determined, although their vitality remains. But even if infectious diseases cannot be conveyed by impure ice, the diarrheal diseases induced are sufficient to exclude the use of ice from such sources.

The following case has been analyzed very closely and the connection is apparently clear: There occurred a fatal case of typhoid fever in a gentleman who for some months had been living alone, his family being absent during the summer and early autumn. As the sanitary arrangements were as perfect as wealth and intelligence could make them, the cause of this isolated case was for a long time a mystery. The fact that he was inordinately fond of ice water led to a suspicion that this might be the cause, and an investigation followed. The ice used was cut from a pond near the houses of laborers on his farm, and, unknown to him, the drains from these houses had been connected with this pond. During the summer there had been in these houses three cases of typhoid fever, one fatal, and the dejections had been thrown into the water-closets without any disinfection. The common practice of the neighborhood was for the house drains to empty upon the open ground whenever a lower level could be reached, or else in some convenient ditch, but as this pond was quite near the houses the drains were led into it. As the pond had been used for filling the ice-house for years, there was no suspicion of any contamination until after the mischief had been caused. The connection seems clear. There is no doubt concerning the pollution of the water by the dejections from typhoid fever patients as reported, nor the other facts as stated. Had the ice been used by others to any extent the proof would have been clearer.

During the summer, I examined thirty specimens of ice water, from ice as supplied to customers from the carts in five different cities. In none of those was there an evidence of sewage contamination, although one was suspicious, as the organic matters were largely in excess, in comparison with the others. The refusal of several companies to sell to the person that was sending specimens, after they had learned by chance the purpose for which it was wanted, led me to suspect that the source of supply was not above suspicion.

The plan adopted was to have from twenty-five to fifty pounds of the ice melted, and the sediment with about a quart of water sent. To secure uniformity, when the larger quantity had been melted, half the quantity sent was used. In twelve of the specimens there was no sediment deposited. In six there was not enough to cover the bottom of a quart bottle, and in the remaining twelve the deposit varied from an eighth to nearly half an inch. None developed offensive odors except in two instances, though the bottles were kept corked in a warm room four months, some of them. The bulk of the deposits was formed evidently of substances held

ension in the water. The field and water grasses broken in :agments were most frequently encountered. Next to these, orphous flocculent deposit of partly decayed vegetable that had been held in suspension in the water. The micro-evealed some diatoms and fragments of microscopic plants imals, such as are most common in fresh water, and some ecimens nearly complete. In one there were fragments of tissue, and several twigs and bits of bark; sand and dirt ot uncommon. In one there was an unusual quantity of ens of various forms of microscopic plant and animal life, in :ion with fragments of water, weeds and grasses. There ut a few that developed any large amount of microscopic ınd animal life; in fact, but two. In these there were ve colonies of filamentous *algæ* developed. In but six was ny unusual amount of organic residue upon evaporation and ation, and that apparently was of vegetable origin entirely.

en from the Fifth Annual Report of the Connnecticut State of Health, for the fiscal year ending November 30, 1882, 298, 299, first paragraph on page 300, page 301 and half)

APPENDIX "D."

SICKNESS FROM IMPURE ICE.

everal instances the attention of the Board has been drawn ige-contaminated ponds with ice-houses on their borders, and to say, although the evidence of disease thus caused is so iive, many still adhere to the idea that water purifies itself in g. Even the process of melting the ice and demonstrating sence of organic pollution by the microscope, will not always e against the force of the pocket argument. Several isolated f enteric trouble, and one death from the free use of ice d by sewage, have been reported during the year. Fortu-an enlightened public sentiment is compelling the abandon-of such sources of supply, customers insisting on knowing the ice they buy is cut.

en from the Third Annual Report of the State Board of of the State of Connecticut, for the fiscal year ending ber 30, 1880. Page 17.)

APPENDIX "E."

IMPURE ICE.

ugh the kindness of Dr. Orlando Brown of Washington, eld county, under whose care many of the cases were, I am l to place on record the history of cases of disease resulting mpure ice. Through the agency of this board, in several es where large supplies of ice were cut from sewage-contam-

inated ponds or streams—indeed, so near to sources of contamination that it would seem no outside interference would be required—these sources have been abandoned, and purer supplies sought. No cases of disease were traced to the ice in the instances named, as the supply was so general throughout cities, but doubtless such cases did occur, and some of the apparently strange cases have been thus caused. However that may be, it is undesirable to use impure ice, and we are using all means to illustrate and enforce the fact that water is not purified by freezing when it contains any considerable amount of impurities. These cases are similar to the results published by Professors Wood and Sharples, in the Massachusetts reports, and of Dr. A. H. Nichols, in regard to the impure ice at Rye Beach, and the epidemic that followed its use, published in the seventh report of the Massachusetts Board of Health.

(Taken from the Second Annual Report of the State Board of Health of the State of Connecticut, for the fiscal year ending November 31, 1879. Page 16.)

Right here, and at the expense of some irrelevance and of repetition, for the subject is of importance enough to bear repetition, it may be stated that freezing does not free water from organic impurities.* The ice probably contains less than the water, proportionately, but enough remains to produce disease and death oftentimes, where ice has been collected from sewage polluted ponds. As we have repeatedly come in contact, in different parts of the State, with ice-houses along the banks of polluted ponds, sometimes where the water was exceedingly vile, recognizable by its odor easily in the summer months, and, as a corollary, occasionally sickness and death directly traceable to such ice, the fact is noted in this connection while considering dissolved impurities.

(Taken from the Third Annual Report of the State Board of Health of the State of Connecticut, for the fiscal year ending November 30, 1880. Third paragraph on page 12.)

ICE AND SNOW WATER.

In freezing, water becomes purer, losing a large portion of its saline contents. Even calcium carbonate and sulphate are partially got rid of. The air is at the same time expelled. Ice water may thus be tolerably pure, but heavy and non-ærated. Snow water contains the salts of rain water with the exception of rather less ammonia. The amounts of carbonic acid and air are very small.

There has long been an opinion that snow water is unwholesome, but this, if it be true, is probably due to impurities. Ice and snow often contain a good deal of suspended organic matter. Dr. Baker Edwards, of Montreal, found two grains per gallon in the shore ice and one grain per gallon in the river ice.* In Northern

* Further evidence of the impurity to be sometimes met with in ice will be found in the reports of the State Board of Health of Massachusetts, vols. VII. and X.

Europe, the poor classes have the habit of taking the snow lying about their dwellings, and as this is often highly impure with substances thrown out from the house, this water may be unwholesome. It has been conjectured that the spread of the cholera in the Russian winter in 1832 was owing to the use of such snow-water contaminated by excretions. Ice and snow may also be the means of conveying malarious poison to places at a distance.†

THE PITTSFIELD ICE SUPPLY.

Nearly all the ice used here is cut on "Silver lake," which is about twenty acres in extent, and situated to the eastward of the more thickly settled portion of the town. Its outlet into the Housatonic river ordinarily discharges but little water, and the flow is sometimes even toward the lake, which is fed by springs and a small brook, which takes its rise in Frog pond, about half a mile to the north. The sources of pollution on the brook are several dwellings and two factories, the one discharging a small amount of refuse dyestuff from silk-works, the other emptying the overflow of a cesspool for water-closets, used by one hundred and fifty employes. According to Dr. Adams, health officer of Pittsfield, the water is sometimes quite foul in appearance, but oftener comparatively clear. Looking upon this source of pollution with some suspicion, he sent specimens of water for analysis. Prof. Nichols afterwards visited the locality, at the request of the secretary of the board, and obtained several more. From the results of analysis, it will be seen that the ice is considerably purer than the water of the pond, thereby showing that the process of freezing does tend, to a considerable degree, to purification. Chemical examination alone does not indicate that the ice is unfit for domestic use, nor does it ordinarily detect a very slight degree of pollution, which may be offensive to our sense, from the fact that we previously knew of its presence.

Considering the great dilution of filth which may often take place without securing immunity from disease consequent upon taking such filth into the system, there can be no question as to the propriety of putting a stop to this contamination at once, especially in view of the fact that it is likely to increase rather than diminish.

The large amount of inorganic matter is thought, by Prof. Nichols, to be due to mineral salts dissolved in the waters of the springs, which, indeed, have been found hard and unfit for use in boilers.

There are a few dwellings and a shoe factory on the borders of the lake itself.

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† See paper by C. Smart, M. B., C. M., Captain and Assistant Surgeon, United States army, "On Mountain Fever and Malarious Water," American Journal of the Medical Sciences, January, 1878. See, also, report on hygiene, A. M. D. Reports, vol. XIX. Parke's Hygiene, page 21.

Examination of water from Pittsfield, Mass. (*Results expressed in parts per* 100,000.)

Number.	DATE.	Locality.	Ammonia.	Albuminoid ammonia.	Solid Residue.			Chlorine.
					Inorganic.	Organic and volatile.	Total at 212 deg. Fahrenheit.	
74	February 21, 1876	Frog Pond (1)	0.0072	0.0212	2.64	2.44	5.08	0.04
75	February 21, 1876	Brook (2)	0.0180	0.0120	18.08	2.28	20.36	0.36
67	February 16, 1876	Brook (3)	0.0140	0.0180	9.58	2.78	12.36	0.21
58	November 21, 1875	Brook (4)	*0.1400	0.0848	16.64	4.64	21.28	0.67
68	February 16, 1876	Brook (4)	0.0060	0.0156	9.06	2.84	11.90	0.18
59	November 21, 1875	Lake (5)	0.0210	0.0200	10.28	2.60	12.88	0.26
69	February 16, 1876	Lake (5)	0.0180	0.0152	10.32	2.72	13.04	0.30
70	February 16, 1876	Lake (6)	0.0220	0.0140	11.92	2.60	14.52	0.35
71	February 16, 1876	Lake (7)	0.0200	0.0136	11.60	2.68	14.28	0.38
76	February 21, 1876	Ice from lake — Unfiltered	0.0072	0.0061	0.93	0.58	1.51	....
		Ice from lake — Filtered	0.0077	0.0013	0.30	0.14	0.44	0.02
72	February 16, 1876	Housatonic river	0.0042	0.0039	4.84	2.64	7.48	0.11

* Unfiltered gave ammonia, 0.1400, albuminoid ammonia, 0.0520.

(1) Taken near the middle of the pond.
(2) Taken at Lincoln Street bridge, some distance above silk factory.
(3) Taken just above drain from silk factory.
(4) Taken between silk factory and lake.
(5) Taken at eastern end of pond, midway between north and south shores, at surface.
(6) Taken at same point, near bottom, fifteen feet from surface.
(7) Taken from bottom of pond at west end, thirteen feet from surface.

(Taken from the Seventh Annual Report of the State Board of Health of Massachusetts, January, 1876, pages 274 and 275.)

APPENDIX "F."

THE PURIFICATION OF WATER BY FREEZING.

No one will contend that all ice is equally no more than that it is absolutely pure, but will, in all probability, admit that our aim should be to appropriate that the most pure and wholesome. With this end in view, at the instigation of Dr. Vaughan, we have been induced to make a series of experiments, by no means at an end, but the results of which to date have been as follows:

Our first experiments were with crystalloids, and first of these with urea dissolved in distilled water and afterwards estimated by Leibig's method.

100 c. c.* of which before freezing contained .83 grams.†

100 c. c. of which from ice contained .50 grams.

100 c. c. of which not frozen contained 1.3 grams.

In other words a "casting out of .33 grams or 40 per cent by freezing."

The second experiment with urea as found in normal urine and estimated by nitrogen:

7,300 c. c. before freezing = .91 of 1 per cent.

165 c. c. from ice = .42 of 1 per cent.

Showing a purification of 53 per cent by freezing.

A third experiment with grape sugar in which —

100 c. c. of original solution contained 1.5 grams.

100 c. c. of ice contained .96 grams.

A purification of 55 per cent by freezing.

In the fourth experiment arsenic ($As_2 O_3$) was dissolved in ammonia ($NH_4 OH$), and diluted to 1,000 cubic centimeters with distilled water, as analyzed by Mr. T. H. Hubbard, of the pharmacy department:

1,000 c. c. of original solution contained 1.78 grams arsenic ($As_2 O_3$).

500 c. c. of ice solution contained .48 grams arsenic ($As_2 O_3$).

500 c. c. not frozen solution contained 1.3 grams arsenic ($As_2 O_3$).

A 40 per cent purification by freezing.

I may also add just here the one experiment by Hassall, in which a part of the water was frozen artificially:

	In the original solution.	In the ice.	In the water left.
Total solids	27.0	3.0	14.2
Chlorine	1.94	0.9	......
Lime	10.53	Trace.	14.11

* One c. c. — one cubic centimeter — .27 fluid drachm.

† One gram — 15.434 grains.

The deductions from which would tend to prove more purification than in the former cases.

Our next observations were of colloids, and we regret that they have been confined to albumens, but since they are quite constant as to results, the three will be better proof of the one fact.

In the first, about 1,000 c. c. of a solution of egg albumen were frozen solid.

50 c. c. of the upper third contained 3.015 grams.

50 c. c. of the middle third contained 4.19 grams.

While 50 c. c. of the lower third contained 6.87 grams.

Showing a gradual but slight purification from above downwards.

In the second experiment with albumen as found in albuminuria:

50 c. c. from ice contained .5 grams.

50 c. c. from unfrozen contained .8 grams.

Or a purification of about 20 per cent.

In the third experiment with egg albumen:

50 c. c. of original solution contained .25 grams.

50 c. c. of ice solution contained .21 grams.

50 c. c. of solution left contained .35 grams.

A purification again of about 20 per cent.

As will be noticed, the purification of crystalloids is at least 30 per cent greater than that of colloids.

It is obvious that these results must vary with the rapidity of freezing; but as these specimens were frozen naturally and under the varying temperatures to which common ice is subjected, they may be regarded as even more applicable to the general purposes of sanitary work.

The conclusions drawn from the foregoing were quite beyond our expectations, not supposing that there would be so great purification as has been evident. But while this information has been somewhat of a surprise, it is also sufficient proof that we cannot, as sanitarians, admit the indiscriminate collection of ice, as is too often practiced, but should lead us to earnestly endeavor to persuade the public that pure ice can only come from pure water.

That ice from water of cesspools or water receiving foul drainage, as from sewers, barns, privies, cemeteries, cellars, or containing any dead and decaying animal or vegetable matter, or from muddy streams or shallow and stagnant pools, cannot be pure, and the practice of gathering and using such is absolutely injurious to health, even if used for no other purpose than that so common of packing poultry or any fresh meats.

In other experiments, which we hope to complete in the near future, we shall attempt to estimate the purification, if any, as affecting the numerous organisms so common in water. * * *

C. P. PENGRA.

(Taken from the Tenth Annual Report of the Secretary of the State Board of Health of the State of Michigan, for the fiscal year ending September 30, 1882. Pages 49 to 50, inclusive.)

With reference to objections of companies taking ice from Fresh Pond, and to the extent to which any impurity in water is removed during the process of freezing,* Professor Sharples made some experiments, the results of which may be found in the following table and remarks:

Analyses of samples of water and ice by S. P. Sharples.
(*Results given in parts per* 100,000.)

JANUARY 11, 1878.	AMMONIA.			SOLID RESIDUE.		
	Free.	Alb.	Total.	Volatile.	Fixed.	Total.
Fresh Pond water	.0128	.0192	.0320	3.00	9.00	12.00
Fresh Pond ice	.0060	.0075	.0130	1.50	3.50	5.00
Spy Pond water	.0640	.0128	.0768	4.00	13 00	17.00
Spy Pond ice	.0064	.0064	.0128	1.50	3.50	5.00
Little Spy Pond water	.0160	.0226	.0386	4.00	7.00	11.00
Little Spy Pond ice	.0050	.0060	.0110	1 00	1.50	2.50
Pond hole at slaughter-house, near Fresh Pond, water	0.352	.1472	.1824	10.00	7.00	17.00
Pond hole at slaughter house, near Fresh Pond, ice	.0060	.0090	.0150	1.50	1.00	2.50

"The depth of the water at the various places is about as follows: Fresh Pond, thirty feet; Spy Pond, fifteen feet; Little Pond, twenty feet; pond-hole, eight feet. The pond-hole was made by digging out the muck in the swamp back of Niles Brothers' pig-house (P). The water from the melted ice was in all cases perfectly clear. The water from the pond-hole, under the ice, was of a shiny wine-color.

"The ice was broken into small pieces, and placed in a wide-mouthed bottle, which was tightly corked, and kept corked until the ice had melted. The water in each case was taken from the same spot as the ice. The ice was taken by clearing the surface, then chopping out a sufficient quantity with an axe, and afterwards breaking a hole through the ice, when the water was dipped out and placed in a demijohn."

These results of Professor Sharples have been subsequently confirmed by Professor E. S. Wood, who has also kindly given the following statement of impurities in ice examined by him for Dr. Amory of Brookline. In the first case, the excessive amount of impurity may have been due to some local source upon the ice. A certain amount of sickness was thought to have been traceable to it. Nos. 3 and 4 were directly from the pond. Nos. 1 and 2 were delivered to houses.

* See also an article by Dr. A. H. Nichols, p. 455, of the Seventh Report of the Board, in which severe intestinal disorder was shown to have been caused by the use of impure ice.

Analyses of samples of impure ice, by Professor E. S. Wood (Results given in parts per 100,000,)

DATE.	Locality.	N H_3	Alb. N H_3	Cl.	Inorg. res.	Org. and vol.	Total res.	Remarks.
Dec. 3, 1876	Horn Pond	0.0026	0.044	0.4	1.6	7.6	9.2	Very turbid.
Jan. 23, 1877	Hammond's Pond.......	0.0066	0.019	......	1.0	1.4	2.4	Much clearer than above.
Feb. 12, 1877	Jamaica Pond Ice Co...	0.018	0.016	0.3	0.4	0.4	0.8	Quite clear.
Feb. 12, 1877	Jamaica Pond Ice Co ..	0.026	0.016	0.3	0.4	0.8	1.2	Quite clear.

(Taken from the Tenth Annual Report of the State Board of Health of Massachusetts, January, 1879, pages 119 and half of 120.)

APPEDDIX "G."

RIVER POLLUTION.

Early in February last the attention of the Board was called to the pollution of the Ammonoosuc river, as follows:

LISBON, N. H., *February* 2, 1882.

Dr. I. A. WATSON, *Secretary State Board of Health, Concord, N. H.:*

DEAR SIR.— As chairman of the board of health of this town, I desire to call the attention of the State Board of Health to what I have regarded for quite a long time as a public nuisance in this section. I refer to the filthy condition of the Ammonoosuc river, in consequence of filth and *debris* of all kinds being thrown into the river in towns north of us, but more particularly in the town of Littleton, where there is a large amount of glove-making done, and the hides are tanned there for that purpose. For a time, I am told, it was their custom to cart this waste material away to the compost heap; but for several years, as I am informed, they have practiced throwing it all in the river; and the amount of it is very large in the aggregate. I took the trouble several times during last summer to examine the water in the river, and found an abundance of hair in it every time. In the various processes of tanning with the chemicals used, you can hardly estimate the amount of filth which comes down the river. Manufacturers complain of its sticking to the racks of their flumes and obstructing the flow of water, but I have never examined them myself. Some of our citizens are packing ice from the river in which hair is plainly seen frozen into it. Such ice, I think, is entirely unfit for use.

Another source of pollution is in summer, when the water is usually low. The town or village of Bethlehem, and many of the large mountain houses, run their sewage into this river — at least I am told that such is the case. This, of course, would be a

sensitive question for the board of health to approach, but I think it is one worthy of consideration at least, for I think the time will come when those living near the river will demand that something *shall* be done.

I make these suggestions for your consideration, and I feel that some action should at once be taken in regard to Littleton tanneries; at least I hope you will take the trouble to investigate the subject and satisfy yourselves.

Respectfully yours,
O. H. BOYNTON.

In my reply to the above, request was made that a sample of the contaminated ice be sent to the office of the Board for examination. Prompt compliance of the request followed. A box containing probably fifteen or twenty pounds of ice was received, and with it a letter, to wit:

Dr. I. A. WATSON:

DEAR SIR. — Yours of the twenty-eighth came to hand last night. The samples of ice I sent you came from the canal near the mills, a few rods below the dam, while the ice for storage is cut in the mill-pond above the dam, some of it very near the dam. I should have got it from there but they had ceased cutting some time ago, and it was frozen over, and quite a depth of snow on it, and it would have been quite a job to get it. The people of Bath, who have formerly got ice from the river, found it so bad that many of them got their ice from Mink pond, some three miles from here, making some eight or nine miles distance to draw it, as they are obliged to come through Lisbon to get to the pond. I should prefer that you come here and investigate for yourself, and you can easily get all the proof and affidavits or depositions you wish, and, I think, get a better idea than I can give you.

* * * Should you conclude to come I will render you any assistance I am able to.

Respectfully yours,
O. H. BOYNTON.

The sample of ice received, it will be seen, was taken from the river ten miles below the tanneries complained of, and Bath, to which reference is made, is fifteen miles below Littleton. The ice was sent Saturday afternoon, and by an oversight remained at the railroad station over Sunday. The warmth of the baggage-room, in which it was left, developed from the box such an intolerable *stench* that it was ordered to be placed outside of the building. The contents being unknown to the station men, it was a source of considerable apprehension and some alarm, as well it might be.

The fact is important only as an illustration that the ice must have been badly contaminated with putrefactive animal matter to

have yielded such disgusting evidence to the sense of smell. When delivered at this office the odor was so offensive that the sample was placed in the yard outside of the building. A visual examination revealed large quantities of hair, small pieces of animal tissue, saw-dust in a partially decomposed state and fresh wood shavings, the latter of which was undoubtedly a product of the mills at the dam, below which the ice was taken. About two pounds of this ice was slowly melted in a warm room in a clean basin, and then put into a large bottle and thoroughly sealed. In a few days some small yellow-colored oil globules appeared upon the surface of the water, which in the course of a month entirely disappeared, leaving the water slightly tinged with yellow, in which condition it seems to remain without further change.

THE TANNERIES.

The glove business at Littleton is a comparatively new industry for that town, the business having developed in a very few years to gigantic proportions. The two large companies, the Saranac and Eureka, have each a tannery, aside from their large manufacturing establishments. Some idea of the magnitude of these industries may be gathered from the fact that the sales for the last year amounted to over $500,000; about 225,000 skins were used, weighing in the aggregate 700,000 pounds before being tanned. About three hundred men, women and children are employed at the tanneries and shops, and two or three thousand women, engaged a part of the time, in making gloves outside of the shop. The amount of waste estimated from the process of tanning, etc., is over two hundred tons, a greater portion of which has been allowed to go into the Ammonoosuc river. No direct complaint has been made to the proprietors of these tanneries, excepting from mill-owners below, and that on account of the obstruction caused by the hair which was carried down the river. Land-owners along the river were pleased with the result of the occasional overflow of the river, which carried valuable fertilizing material upon the soil, and resulted in larger crops, and a more abundant hay crop, in some instances doubling the amount.

A VISIT TO LISBON AND LITTLETON.

April 6, the secretary visited Lisbon for two objects: To examine into the cause of sudden fatality in a herd of cattle, elsewhere mentioned, and the contamination of the river.

A few weeks prior to this time the ice had been broken up in the river by a sudden thaw and rise in the water, and immense masses had been piled up promiscuously in many places between the two towns. Acres were covered in this way, and, riding along the railroad even, the ice presented a dirty and filthy appearance. Just above the village of Lisbon, and in view of the same, was a large field of ice, embracing an area of over fifty acres, compactly

driven together, and in some places piled piece upon piece. Upon this the sun had shone three weeks or more, and, of course, it had been steadily melting a great part of the time, as the warm spring days approached. The ice of this great field contained, like the sample sent the Board in the winter, a large amount of hair, considerable animal matter, like fleshings, and saw-dust in all stages of decomposition. The melting process had gone on so slowly that it did not wash this foreign matter off from the ice to the ground, but simply left it lying upon the surface of the ice. The whole surface of this field of ice was so discolored in this way as to present the extremely dirty condition which I have already described, while riding on the railroad, in the fields that were nearer the passing train. I had expected to find considerable pollution of this stream, but my mind had not been prepared to witness such wholesale contamination as was before me. An examination of the meadows on the opposite side of the river, where there was no ice, revealed the same condition that will exist when the vast quantities of ice mentioned are melted, to wit, an almost incomprehensible amount of *debris* scattered over the entire surface. In some places this refuse material was evenly spread over the ground to the depth of an inch; in other places it had seemed to drift, and was found to be in patches a few feet wide and several rods long, to the depth of from four to twelve inches; in some other localities it had only discolored the surface without leaving it in any considerable quantities, though everywhere could be found this particular waste, hair and fleshings, from the tanneries. The immense amount of saw-dust was another notable condition, and one which, though not so offensive in its character as the product of the tanneries, is by no means to be ignored. The bushes and shrubes which grew along the banks of the river were completely fringed with hair as far up as high-water mark; indeed, they furnished an excellent and accurate register of the height to which the water had reached. It was also stated that a turbine water-wheel at Lisbon had become completely filled and packed with the hair, so that it was stopped in consequence of the same; that the flume racks became filled by slow accumulation, and necessitated the removal of the same; also that the paper-pulp mill at that place had to strain all of the water used in their various processes, and, in so doing, the pipes and strainers would become filled with hair, and oblige them to suspend work till the same was removed. These facts are mentioned to give a faint idea of the extent of this particular trouble.

The pollution of this stream is without a parallel in the State, owing to the character and extent of the contamination. Information received at Littleton concerning the process of tanning, and the various chemicals used, leads to the conclusion that no substances were used in the various manipulations and methods employed in preparing the leather, which would at all injure the character of the river; dilution and chemical changes through

oxidation would be so rapid that probably no trace of the substances used could be found even a few rods below their entrance into the river. The only contamination, then, coming from the tanneries mentioned, is of an animal character, to wit, hair and fleshings. From the nature of these substances, rapid decomposition and oxidation is impossible, consequently the pollution of the stream would be even greater at a given distance from the point of entrance into the river. How far these substances may be traced below the Ammonoosuc, in the Connecticut river, has not been ascertained, but undoubtedly to quite a distance. Ice taken from the Connecticut river, near the mouth of the Ammonoosuc, contained hair from these tanneries.

ABATEMENT OF THE NUISANCE.

After an examination of the condition of the river, and the immediate effects of such pollution, a visit was made to the glove companies at Littleton for the purpose of settling, in some way, this difficult question. It was apparent that such a state of affairs could not be allowed to exist, as the result would be dangerous to the health of the people, detrimental to manufacturing interests, and in many other ways intolerable. Parties suffering from the results of such wholesale river contamination were upon the verge of commencing suits, not only for an abatement of the nuisance, but for special damages. This intention seemed in no way to be a malicious one, as it was stated, evidently upon good authority, that if the tanneries would cease at once putting their waste into the river, no suits would be entered. Upon visiting Littleton, and interviewing the companies mentioned, they asserted that no complaint had been made directly to them, with a single exception, from any source, and, with a candor and promptness which are rarely exhibited by prosperous corporations, especially in a matter which would result in cost and inconvenience, they expressed a willingness to immediately put in execution the recommendation of the Board, to wit, *to allow no more waste from their factories and tanneries to enter the river*. This determination, though resulting in considerable immediate expense, has been faithfully carried out, as a subsequent visit and examination have shown; so that this extensive source of pollution has been effectually removed. Too much credit cannot be given the Saranac Glove Company and the Eureka Glove Company (owners of all the tanneries) for the willingness and promptness which he exhibited in bringing the case to an early and satisfactory termination, and that, too, in a generous and public-spirited manner. Without a question as to the legal view of the case, or a suggestion that they were within the reach of any of the various processes of the law, they responded simply upon being asked; and the people who have been inconvenienced by the former pollution of this river should credit these companies with a spirit of fairness and consid-

eration, which is, indeed, merited. It is to be hoped that all thoughts of suits in the case will, if they have not already, be abandoned.

It is to be expected that some of the results of this extensive pollution will be evident in some localities along the river during the present season. The debris which the early freshets in the spring carried upon the banks and meadows will, of course, remain, and, it is possible, may be a source of annoyance at some points, even at the present time; however, the process of oxidation will very soon destroy all that may now be objectionable, and the original purity of the water and cleanliness of the banks and overflowed lands will, so far as the tanneries are concerned, be restored.

THE CONTAMINATED ICE.

That last winter's product of ice from this river between Littleton and the Connecticut river (20 miles) is wholly unfit for use, does not admit of a doubt. Even ice taken by parties at Woodsville from the Connecticut river, near the mouth of the Ammonoosuc, contained hair in quite visible quantities. Under no circumstances should the ice mentioned be used for drinking purposes, even though to the eye it presents the appearance of absolute purity. It is a popular fallacy that ice purifies itself; that water in freezing eliminates all organic impurities; such is not true; water that is contaminated produces ice of the same character. There are many instances on record in which impure ice has produced serious and alarming sickness. It is not necessary that such ice should be contaminated to that extent that it may be seen with the naked eye, to render it unfit for use. Water may be badly polluted by foreign matters in solution, and the ice produced therefrom be equally dangerous to health. So, then, the present stock of ice from this river should be regarded with great suspicion, however fine its appearance.

(Taken from the First Annual Report of the State Board of Health of the State of New Hampshire, for the fiscal year ending April 30, 1882, pages 53 to middle of 59.)

APPENDIX "H."

PURIFICATION OF WATER BY FREEZING.

As a supplement to former experiments upon this subject (see pages 48–50 of the Report of Michigan State Board of Health, 1882), I have made recent observations which confirm the conclusions then drawn, that freezing does not purify water to the extent generally supposed. I then found that the purification by freezing was about fifty per cent for crystalloids and only about twenty per cent for colloids.

As the results presented in my former papers were not concerned with the living organisms so frequent in polluted water, the following experiments were deemed necessary. The micro-organisms used were such as may be obtained from decomposing meat juices, infusion of hay, and stagnant pools. Each specimen of the fluid was divided into two equal portions, one to be frozen, and the other to be reserved for comparison. The freezing was effected by exposing the fluid to the winter's cold. In each experiment ten drops of each portion were examined and the averages taken.

The first experiment was with *bacteria*. The average number per drop found in each portion was: In the melted ice of the upper half of the exposed fluid, sixteen; in the lower half, partially frozen, 250; in the upper half of the unfrozen portion, 160; in the lower half of same, 170.

In all cases the number of organisms in each of ten drops was counted and an average taken. This experiment shows a purification of about ninety per cent. The averages in different portions of the unfrozen fluid show that the organisms were quite evenly distributed therein, which was also true of the following.

The second experiment was with the *coleps hirtus* of stagnant pools. The averages being taken as before, the following results were obtained: Upper third of ice contained twenty-five per drop of water; middle third contained 190 per drop; lower third contained 500 per drop; in the unfrozen fluid the average of fifteen drops was 300.

This shows a purification of 91.6 per cent in the upper third of the ice, with a gradual decrease downward. In this case the fluid was frozen through and through solid.

In a third test with *paramoecium aurelia* from a muddy pool the following results were secured: The water from the ice contained thirty per drop; the water under the ice contained 590 per drop; the unfrozen fluid reserved averaged 450 per drop. This showed a casting out of 93.3 per cent.

The fourth test was with *glaucoma scintillans* from infusion of hay, the following figures were obtained: Water from upper half of ice contained ten per drop; water from lower half of ice contained 120 per drop; unfrozen liquid averaged ninety-one per drop. A purification of eighty-nine per cent is secured in this case.

These figures seem, at first, quite encouraging, especially when compared with the results given in my former paper with chemical impurities. However, when we remember that freezing does not kill these organisms, and that they multiply rapidly, there is not so much consolation, as such ice may prove a fertile source of infection. The entire series of experiments shows that pure ice can come only from pure water, and that great care should be exercised in gathering this useful commodity.

Admitting the above, the question as to the best time of gathering ice arises. In answering this, the following analyses may be of

value, not only as showing how impure ice may become, but the circumstances attending its formation, together with its natural surroundings, have a direct bearing on hygiene. The ice, which was about eighteen inches thick, was cut and examined in such a way that we may speak of its upper and lower halves. One liter of water from the upper half gave the following results: Total solids, 0.5 grams; free ammonia, 1.333 milligrams; albuminoid ammonia, 0.8 milligrams; nitrates, abundant.

Analysis of one liter of water from the lower half of the ice showed the following: Total solids, 0.1 grams; free ammonia, 0.12 milligrams; albuminoid ammonia, 0.16 milligrams; nitrates, test.

Taken alone this analysis seems to disprove the fact that there is a gradual purification in freezing downward; but a brief consideration of the circumstances will solve the mystery. The stagnant pool (for such it was from which this ice was taken) is surrounded by steep hills which begin at the very water's edge. At the summit of the hill on one side stand four houses, each with barn and privy. On the opposite side of the pond the hillside is covered by an old cemetery and has a considerable growth of trees. The lower half of the ice was frozen early in the winter, and the water frozen at that time underwent the partial purification shown to take place in our experiments. Subsequently there was a fall of snow, followed by thaw and rain. The decomposing matter from the hillsides was washed down upon the first layer of ice, and, it becoming colder again, there froze a distinct color in the ice marking the depth of this increase. Whatever purification might have taken place was limited by the surface of the lower half of the ice, as a result of which we have no purification in the upper half. We can easily see that in this way many additional layers of impure ice may be added.

From the foregoing we must conclude that the pollution of ice often accompanying partial thaws and subsequent freezings should be considered in harvesting, and that the first ice of winter is the purest. It is needless to suggest that skaters carry large amounts of impurities on the ice, and that fields selected for harvest should be protected from them. Even a heavy fall of snow upon ice may contaminate it to a considerable extent. An analysis of snow falling upon a pond near the laboratory, collected during the storm, showed the following: Total solids per liter of water from the snow, 0.12 grams; free ammonia per liter of water from the snow, 0.4 milligrams; albuminoid ammonia per liter of water from the snow 0.21 milligrams.

The excess of free and combined ammonia may be in a measure accounted for by the nearness to the chemical laboratory of the University of Michigan.

The purest snow, gathered away from cities, contains on an average: Free ammonia, 0.3 milligrams per liter; albuminoid ammonia, 0.08 milligrams per liter.

Since writing the above I have been favored with an opportunity of testing still further the validity of the ground taken. A specimen of ice, which had been garnered before any rain or thaw had come upon it, showed on analysis the following results, per liter: Total solids, 0.08 grams; free ammonia, 0.19 milligrams; albuminoid ammonia, 0.09 milligrams; nitrates, none.

I afterwards gathered some ice from the same source, but there had been some rain, snow and drainage from thawing upon it. Skaters also had been upon the ice. Analysis showed the following results, per liter: Total solids, 0.6 grams; free ammonia 0.28, milligrams; albuminoid ammonia, 0.6 milligrams; nitrates, very abundant.

The deductions from these analyses serve to confirm my former convictions and sustain the conclusions already given.

C. P. PENGRA.

(Taken from the twelfth annual report of the secretary of the State Board of Health of the State of Michigan, for the fiscal year ending September 30, 1884. Pages seventy-nine to middle of eighty-one.)

PROCEEDINGS OF ACADEMY OF NATURAL SCIENCES, PHILADELPHIA, *Oct.* 28, 1884.

ORGANISMS IN ICE.

Prof. Leidy stated that a member had placed in his hands, for examination, a vial of water obtained from melting ice which is used for cooling drinking water. From time to time, among some sediment taken from a water cooler, the gentleman had observed what he supposed to be living worms, which he suspected were introduced with the water into the cooler, and not with the ice. Upon melting some of the ice alone, the worms were still observed, and the water submitted for examination was some that was thus obtained. Prof. Leidy was surprised to find a number of worms among some flocculent sediment, mainly consisting of vegetal hairs and other debris. Beside the worms, there were also immature anguillulas, and a number of *rotifer vulgaris*, all living. It would appear that these animals had all been contained in the ice, and had been liberated on melting. It was an unexpected source of contamination of our drinking-water, that Prof. Leidy had previously supposed to be very improbable. The little worms he was not familiar with.

(Academy of Natural Sciences. Proceedings, 1884, page 260.

THE ACTION OF COLD ON MICROPHYTES.*

Professor McKendrick of Glasgow, gave at the recent meeting of the British association an interesting account of the methods of trying to destroy small organisms like bacteria, not as is commonly done by heat, but by cold. It is known that by means of Coleman's cooling machine meat may be kept from putrefying for a considerable time, but in attempting to sterilize a putrescible solution by means of cold, it was found that though in some cases putrescence was delayed, in no case were the organisms completely destroyed. Organic fluids were exposed to temperatures more than 120 degrees below 0 deg. F., but on thawing they were found to contain living organisms still. * * * * * * *

It is well known that frogs have been found in blocks of ice and been revived. Frogs have been frozen at twenty degrees F. in about half an hour. On thawing slowly, the animal, in two instances, completely recovered. When it was frozen for longer than half an hour it did not recover; but, though reflex action was gone, there remained some irritability both in nerves and muscles. It was found, also, that certain vital functions may be arrested by cold, and thus conceivably higher organisms may be kept vitally inert for an indefinite time. Experiments were also tried on warm-blooded animals. A rabbit subjected to a temperature 100 degrees below 0 deg. F., recovered. No temperature lower than seventy-three degrees below 0 deg. F., has been obtained in free atmosphere. (Science, October 30, 1885, page 393; Science, supplement, October 30, 1885, page 393).

APPENDIX "I."

SYRACUSE, *April* 3, 1886.

TO JAMES T. GARDINER, Esq., *State Board of Health:*

I, William H. Pollman, health inspector to the board of health of the city of Syracuse, do hereby testify that the facts given below are as near correct as it can be given.

By a resolution passed by the board of health, February 10, 1886, the health inspector was instructed to get ice and water from the following places: Onondaga, Cazenovia lakes and Wide Waters. The ice and water were taken from lakes and Wide Waters on March third and sent to Albany the same day.

Mr. Sawmiller's ice and water were taken from Onondaga lake, 3,000 feet from the mouth of Onondaga creek and 1,200 feet from the shore and from mouth of Bear Trap creek.

Gee Bros. ice and water were taken from Onondaga lake, 1,500 feet from the mouth of Onondaga creek, 1,200 feet from east shore of lake.

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* From Nature.

Listman's, now Warner's, ice and water, marked No. 2, were taken from Onondaga lake, two miles from the mouth of Onondaga creek and 600 feet from east shore of lake.

Knapp's ice and water were taken from the Wide Waters at the foot of cherry street, about 100 feet from south dock, near or south side of the channel.

Listman's ice and water, marked 5, were taken from Cazenovia lake, in center, and 300 feet from east shore in thirty feet of water.

Respectfully,

WILLIAM H. POLLMAN,
Health Inspector, Syracuse.

Sworn to before me this the 5th day of April, 1886.

P. D. COONEY,
Commissioner of Deeds, Syracuse, N. Y.

APPENDIX "J."

LABORATORY OF THE ALBANY MEDICAL COLLEGE,
ALBANY, *March* 20, 1886.

Dr. F. C. CURTIS, *Acting Secretary, State Board of Health, Albany:*

DEAR SIR.— I transmit herewith a tabulated report of the analyses of five samples of water, and five of ice, which samples were sent to the State Board of Health by Wm. H. Pollman, health officer of Syracuse, N. Y., and delivered to me on March 4, with the exception of sample of water No. 5, which was received March 9. The water was contained in large glass bottles and the ice consisted of large cakes, with labels securely attached, packed in sawdust. The ice was unpacked as soon as received and each cake separately cleansed, broken in pieces, the pieces rinsed in distilled water and placed in large glass jars closed air tight and allowed to melt. The "color and appearance" and "odor" as stated in the table of results, of course, refer to the water from the ice and not to the ice itself. By request of Mr. Carman samples of each of the waters and ice were sent to Dr. Wm. Hailes for biological examination.

It will be observed that the three samples of water from Onondaga lake and the single sample from Wide Waters, Erie canal, are rated as "bad" while that from Cazenovia lake is classed as "doubtful." The chlorine in the Onondaga lake waters is exceedingly high, but this may be partly or chiefly owing to the geological strata in the vicinity. The samples of ice with the exception of No. 2, from Onondaga lake are rated as "good." In No. 2 the albuminoid ammonia is low, but the free ammonia rather high, and

it is classed as "not completely satisfactory." It will be observed that freezing has almost entirely removed the dissolved solids which the waters contained, including the chlorides, and has reduced the amounts of free and albuminoid ammonia very greatly, and largely diminished the amounts of oxygen absorbed. From a chemical standpoint, the ice is vastly purer than the waters, but this does not necessarily prove that micro-organisms or specific germs, if present, have been destroyed or removed in a similar ratio.

Yours respectfully,

WILLIS G. TUCKER,

Analyst.

REPORT ON A SANITARY INSPECTION OF THE STATE HOUSE.

ALBANY, *December* 30, 1886.

To Dr. LEWIS BALOH, *Secretary State Board of Health.*

DEAR SIR. — The following memoranda is made of a recent sanitary inspection of the State House.

PLUMBING.

The main part of the waste matter of the building discharges through one outlet drain. This is located in the basement, apparently starting not far from the center of the building and running beneath the surface under the hall-way to the north or Steuben street door and thence to the Steuben street sewer. It is said to be of vitrified pipe and has not been laid many years. Into this underground drain the main soil pipe, which carries all the waste from the upper floors, discharges, and also a small iron pipe from basins and urinal in the Comptroller's rooms on the first floor; it also, I believe, receives the roof water from four leaders and the discharges from the janitor's apartments, in the basement. It receives, in fact, all the waste from the building except that of a tier of closets in the basement which form a separate system. There has evidently been, at some time, a drain south into Pine street, but apparently all connections with it have been cut off and it receives only surface water outside; the condition of its dead end inside the building, if such exists, can only be ascertained by digging it up.

As to the basement connections with the main or Steuben street drain, there is a detached pan-closet for the use of the janitor's family; it is rather remote, necessitating a long branch, the fall of which would seem to be too inconsiderable; the closet is good for the kind, however, and has a perfect ventilating shaft to the roof. The connections in the janitor's apartments are numerous, consisting of sinks, basins and a bath-tub. The condition of the latter is very bad as its waste-pipe has no trap whatever, and its connection with the main drain is by means of four-inch tile, the joints of which are not even cemented, and we found that water pours from them into the ground when the tub is emptied.

In a laundry and general scullery is an exceedingly old stone basin or sink, which apparently has no trap under it. The other connections seemed in fair condition. In one or two rooms, formerly occupied as offices but now disused, are basins the connections of which are good, but being probably seldom, if ever used, the seals in the traps may be broken by evaporation.

The actual condition of the main drain, it being under ground, can only be learned by excavating it. Its behavior under the peppermint test will be spoken of later.

The main soil pipe is of iron with leaded joints, and it runs in a straight course up through the building to the top floor, where it terminates. On the first floor the connections consist of basins and urinals in the rooms occupied by the Comptroller, State Treasurer and Board of Charities.

On the second floor, at the end of the hall toward Steuben street and close to the soil pipe are two closets of the Demorest pattern. These have *no traps*, the only seal being the water retained in the basin by the plunger. In the same small apartment are a slop basin and urinal, neither of which appears to be provided with traps. In the rooms on this floor, occupied by the State surveyor and the department of geology and paleontology, are good basins with proper connections.

On the third floor, at the end of the hall directly above the closets on the second floor, is another single Demorest closet, provided with a trap. Over it is a large water tank for supplying the closets. The overflow-pipe of this is carried to the soil pipe of the closet and connects with it at the crown of its trap and *below the seal;* a strong draught down it was found and a lighted paper was extinguished by the suction when the pull-handle of the closet was raised. A later trial showed a gentle draught upward. The sewer air manifestly has direct access to the building through this pipe. In the rooms of this floor, now being prepared for museum and laboratories of the department of geology, are new basins and sinks of good construction, the traps of which have one inch ventilating pipes carried through the roof, the only thing of the kind in the building.

Besides this system which carries almost all the waste from the building there is a tier of closets and urinals in the basement which has a separate drain directly into the Steuben street sewer, on which side of the building they are placed. It is only a few years since these were introduced. They consist of six plunger closets in a tier and two or three urinals. They are provided with traps and appear to work efficiently; on testing with peppermint the odor came faintly up from holes between the broken flags of the floor, which would appear to indicate that the drain is not perfectly tight and may possibly be of vitrified pipe, but this can only be ascertained by excavating. The soil pipe is not carried above this floor; it has, however, a foot vent just outside the wall of the building. The floor and walls of the apartment are in a dilapidated condition.

HEATING.

The building is almost entirely warmed by means of stoves. There is, however, a portable heater in the basement which conveys heated air to two registers only; one in the main room of

the Comptroller's suite, and one to a small room adjoining. This heater is situated in the basement hall or corridor under which the main drain runs and near the Steuben street door. The cold air box with which it is supplied opens in the side of the basement door about three feet from the "cess-pool" or catch basin to the drain for the reception of surface water; thence it is carried under ground, alongside of the drain, to the heater. The impropriety of its environment will be emphasized later.

TESTING THE MAIN DRAIN SYSTEM.

The ordinary peppermint test was applied to the main system, a mixture of oil of peppermint and ether being poured into the overflow pipe in the tank in the top floor by means of an ingenious contrivance of Mr. Harper, the plumber, who assisted me. The odor appeared in the closets on the second floor, those noted as having no traps. The basement was soon filled throughout with the odor and it came strongly up the registers of the heater to the first floor.

PRINCIPAL FAULTS FOUND.

First. The main underground drain in the basement is, without doubt, extensively pervious, having open joints and probably boken sections; the more as a constant warfare with rats is necessary. Of course there never should have been a vitrified pipe laid there, in the first place, as this without doubt is, nor should it have been laid underground.

Second. The janitor's bath tub and old slop sink are not trapped and the former has vitrified pipe outlet the joints of which are not even cemented.

Third. The overflow pipe to the tank on the third floor furnishes a direct opening to the soil pipe and street sewer.

Fourth. The soil pipe is carried to the third floor only and not through and above the roof.

Fifth. There are no traps to the closets and urinal on the second floor. What has not been before noted, the joints of the iron pipe are at least in some cases closed with cement instead of hammered lead.

Sixth. The cold air box to the heater has every facility for taking sewer air, either from the open catch basin outside, very near which it opens, or, with even more facility, from the leaching drain alongside of which it is situated; it runs underground, in itself an evil.

Seventh. If, as seems probable, a "dead end" of the former Pine street drain exists it is a useless and possible source of poisoned air.

Eighth. Reference has not been made to the condition of the basement floor in the hallways and in the apartment containing the water-closets. The floor is mostly brick and flag, is rough, broken, and has numerous rat holes. There is no dampness of the floor, however.

Ninth. There are unoccupied rooms in the basement having basins that are possibly so seldom used as to have the seals in their traps broken by evaporation.

RECOMMENDATIONS.

Of the first necessity is the rectifying the condition of the air supply of the heater. This should have a new air box, opening remote from sewer openings, carried overhead instead of underground and made tight enough to exclude all basement air. Unless this can be done, use of the heater had better be discontinued.

The faulty underground drain should be removed and iron pipe with leaded joints substituted. Nothing less than this should ever be placed in any building occupied by human beings. At the same time the condition of the bath-tub and untrapped sink in the basement should receive appropriate attention.

The overflow pipe to the tank in the third story should be detached from its present point of outlet, and instead carried to the waste pipe of the basin in the room adjoining, to which it can be connected above the trap.

Traps ought to be placed under the closets on the second floor.

These are matters of more pressing importance, and rectification can be effected at small cost. Of less immediate necessity, it is recommended that the main soil pipe be carried through the roof and well above it. It would be well it a similar ventilating shaft was formed for the separate tier of closets, and at the same time the outlet drain to these should be made of iron, if it is found not to be already. "The dead end" of the Pine street drain should be sought for and removed if found. The sewer connections in unoccupied rooms should be frequently inspected or cut. If drains are laid beneath the surface in the hallways of the basement, the entire surface of the hallways should after proper preparation be covered with asphalt and a floor laid above this. Cement joints about the soil pipe and its connections should be sought for, as some were found, and lead substituted.

The ventilation of the building is very perfect, shafts extending to large openings in the dome. Except in the matters referred to it is very well kept, and with the improvements suggested I see no reason why its sanitary conditions should fail to be in every way satisfactory.

Very truly yours,

F. C. CURTIS.

INVESTIGATION OF JAMESTOWN WATER SUPPLY.

The following papers were referred by the Governor to the State Board of Health for action, July 10, 1886.

JAMESTOWN, N. Y., *June* 30, 1886.

To the Hon. D. B. HILL, *Governor of the State New York:*

DEAR SIR. — The city of Jamestown is supplied with its water for domestic purposes, mostly, by a corporation known as the Jamestown Water Supply Company. The water furnished by such company is in part obtained from driven wells, and in part from the outlet to Chautauqua lake. The point at which the water is taken from the outlet is some four or five miles from the lake. On either side of the outlet for the whole distance from the lake is a swamp varying from fifty rods to three-fourths of a mile in width. This swamp is filled with stagnant, impure and unwholesome water, and thoroughly impregnated with decaying vegetable matter. From the lake to where the water company take their water it is a slow, sluggish stream and the water is continually stirred up and thickened by the action of steam-boats passing through the outlet. We have a city of from 13,000 to 15,000 inhabitants, and the constant complaint from a large portion of the inhabitants is that the water which the company furnishes them is filled with dead and decayed fish, or portions of fish, decayed vegetable matter, and is thick and muddy and has an offensive smell, we believe it is a "question affecting the security of life and health," which under section 8 of chapter 322 of the Laws of 1880 your Excellency should require the State Board of Health to examine into.

It is the request of the Common Council of the city of Jamestown that you take action under the act referred to.

Very respectfully yours,

O. F. PRICE,
Mayor.

FRED. R. PETERSON,
Clerk.

JAMESTOWN WATER SUPPLY COMPANY,
JAMESTOWN, N. Y., *July* 3, 1886.

To the Hon. D. B. HILL, *Governor of the State of New York:*

DEAR SIR. — We notice by the proceedings of the city council that a request has been sent you asking for an investigation by the State Board of Health, of the water supplied to the citizens of Jamestown. In this request the company most heartily joins. A long continued and malicious attack, by certain sensational newspapers, upon the quality of the water furnished through the mains of this company has led to frequent demands from the officers of the said company that the question of the purity or impurity of its water supply be determined by the State through the medium of the local authorities, believing, as they do, that a report from such a source would command public confidence.

This course was adopted in June, 1885, upon the payment of all expenses by the water company, and an analysis was made by the chemist to the State Board, Willis G. Tucker, M. D., Albany Medical College, of samples collected by the local board of health.

In addition to this investigation, analyses have been made by Prof. A. A. Breneman, formerly of the Cornell University, now of New York city, by Prof. J. Tingley of Allegheny College, Meadville, Pa., and Walter H. Kent, Ph. D., chemist to the Brooklyn (N. Y.) Board of Health. During the month of May, 1886, Albert R. Leeds, Ph. D., of Stevens' Institute of Technology, came to Jamestown at the request of the Water Supply Company, made a thorough examination of the mode of supply, and, after an extended chemical, biological and microscopical examination of the water, made an exhaustive report upon the subject. This document as well as the reports of the other gentlemen mentioned are at the service of any one whom you may detail to this investigation.

With a further request that the petition of the Jamestown city council may be favorably considered, and especially that the investigation which they ask may be made *personally* by some official of the State Board of Health, or one whom they may designate, we remain,

With the greatest respect,

THE JAMESTOWN WATER SUPPLY CO.,

A. F. KENT, *President.*

After a careful investigation of the whole question, the following return was made to his Excellency January 18, 1887.

To His Excellency DAVID B. HILL,

Governor, State of New York:

SIR.—Upon the petition of citizens of Jamestown, N. Y., to you, concerning the water supply, and referred by your Excellency to the State Board of Health, by order of the Board, I have the honor to submit the following report:

By direction of this office, Mr. Emil Kuichling, an expert civil engineer, was directed to make an examination of the water supply of Jamestown, and report thereon. Mr. Kuichling made such examination in September last, and submitted a long and exhaustive report. (See "B" in Appendix.) The water company objected to the statement of Mr. Kuichling, and asked a hearing before the State Board made a return to your Excellency. This was granted, and at a meeting of the Board held in its office in the Capitol on November 22, 1886, the company was represented by Mr. Lockwood, of counsel, Mr. Kent, an official of the company, and Prof. Albert Leeds, their chemical expert. On the part of the city appeared Hon. O. F. Price, Mayor, and the special committee on water supply, appointed from the Common Council. The authorities of the city were willing and ready to have the State Board report such measures as would seem to it best for your Excellency's consideration and order; but the water company objected on the ground that the evidence before the board was unsworn testimony, and that a sworn officer of the board had not made any examination of the matter in person. It was therefore decided that the secretary of the board should visit Jamestown and investigate into the truth of the report submitted by Mr. Kuichling, and personally examine the sources of water supply. This was done December 7, 1886. It was understood that the water company would furnish affidavits at that time, December seventh, and the city would also put in affidavits if so desired. Neither party had any affidavits made or ready on the date above mentioned. The city again stated its willingness to abide by the report of the State Board and your

Excellency's action thereon, without submitting sworn testimony. The water company declined this proposition; objected to the right of the State Board to make the examination, and wanted more time, if the board was decided upon making a report, in which affidavits could be submitted. It was finally agreed that two weeks' more time be allowed, and that each party was to make such affidavits as they desired, and forward the same to this office, not later than the twenty-first instant. This was done, and your Excellency's attention is respectfully called to these affidavits, marked "D" and and "E" in Appendix.

It may be briefly stated that the water supply of the city of Jamestown as supplied by the Jamestown Water Supply Company, is obtained from three sources: First, from driven wells. It is conceded by all that this supply is pure and wholesome. Second, from the foot of Chautauqua Lake, by means of a conduit, part iron and part wood, of about two miles long. This conduit leads through a swamp. It receives the water from the lake about 200 feet from the shore in a crib made of timber, an inside and outside timber, while between gravel is placed to act as a filter. Wire screens are placed opposite the mouth of the conduit to prevent small fish from getting in. The water has an average depth of about four feet. Third, from the outlet of the lake opposite the steamboat landing, and but a short distance from the pumping station. This water is conceded by all to be unfit for use, and the pipe is put there as a safeguard against fire.

The supply from the driven wells is not found to be sufficient. It has therefore been augmented by lake water of doubtful purity, and by water from the outlet of known impurity. The company state the outlet water has but twice been allowed to flow into the pumping well, both times being when fires were in progress. The city by affidavits state this not to be the case, and strong suspicion is created that this easy way of obtaining a greater supply has many times been resorted to when it was not published or admitted.

With the contract between the city and the water supply company, the State Board considers it has nothing to do. Whether that contract has been violated or not, is no question for the board to pass upon, and therefore it is not taken into consideration.

The question the board has to pass upon and submit to your Excellency is, whether in its judgment the water as supplied to the

city of Jamestown for drinking and cooking purposes, is pure, wholesome, and without menace or danger to the public health. And further, as to whether the sources of supply are such as will give water of this character.

There is no need of taking your Excellency's time in reviewing the driven-well water, or detailing the manner in which it is taken. It is conceded by all parties that it is the best of water, but the supply is limited, and consequently other additional sources are sought.

THE LAKE.

At the point where water is taken from the lake the average depth is four feet. The crib is not a sufficient filter, and can only act as as a screen to the larger impurities. For a long distance in a northerly direction the water is shallow, not reaching at any point, except in the channel which lies to the east, a depth over six to ten feet. Several villages lie along the banks of the lake as well as summer boarding houses, and generally the sewage of these places is discharged into the lake. The channel in mid-summer, opposite the intake crib, is so shallow that the boat wheels turn up the mud in passing, and the wash is thrown over toward the crib, the wavelets striking against it. The bottom is said to be sand and sandy gravel. But a deep layer of mud, having swamp grasses growing in it, covers the sand. Water taken from the lake alongside of the crib, December eighth, and since analyzed by Prof. Leeds, the company's chemical expert, is found by him to contain more free and albuminoid ammonia than is allowed in waters considered chemically healthful. Free and albuminoid ammonia are considered as showing sewage contamination or organic impurity. In parts of 100,000, .013 of free and albuminoid ammonia is considered suspicious. More than this would condemn the water as probably dangerous to health.

Dr. Leeds' analysis of this water, taken at a time most favorable for this lake, ice being over the lake, and the water and bottom consequently not disturbed, shows the water to contain in parts per 100,000, .042 of free and albuminoid ammonia. This shows that the water of the lake, at the crib, at generally the most favorable season of the year for testing water, contains in solution enough nitrogenous particles to chemically condemn it as potable.

THE CONDUIT.

This goes from the crib in the lake to the pumping station, about two miles. For the first part of its course after leaving the crib, it is of riveted spiral sheet-iron pipe, twenty-four inches in diameter. This enters a wooden flume, made of matched boards, and this again connects with a ten-inch iron pipe, which pipe also receives part of the driven wells, and empties into the pumping well. At the end nearest the pumping station, of this wooden pipe, where it connectes with the ten-inch iron pipe, being about a mile and a half from the crib, the flume when opened gave off an appreciable amount of sulphuretted hydrogen, and the water tasted of the same. Prof. Leeds' analysis of this water taken at the same time as the specimen from the lake, gives of free and albuminoid ammonia .0422, showing that in its passage from the lake the water had gained in impurity, and was less proper for potable uses. It had also acquired the sulphuretted hydrogen, which made it unpleasant to taste and smell, showing either that organic matter decayed in the water on its way in the flume, or that impure swamp water found its way into the conduit. This latter is a fair assumption, when the character of the conduit is taken into consideration. It is therefore given as the judgment of this board, that the water as now taken from the foot of Chautauqua lake and supplied to the citizens of Jamestown, is not pure and wholesome water, and therefore is of menace and danger to the public health.

The lake seems to be the only available supplemental source of water supply that Jamestown can draw upon. To make the water safe for potable use would require certain things to be done. Where the lake water is taken at present the average depth is about four feet. This is too shallow to allow of water to be drawn from it; the water becoming heated to the bottom in summer, consequently aiding decomposition of organic matter. It would be necessary then for the intake pipe to be moved some distance to a place where deeper water could be found.

The chances that the water taken even at a point further up the lake would not be free from pollution, would render it necessary that the lake water should be filtered before being sent into the distributing mains. This would be best done by filters or filtering beds, arranged so that they could be cleaned as often as required. It would be better that these filter beds should be near the pumping station.

Owing to the nature of the ground through which the conduit will have to be laid, cast-iron pipe, of proper size, should be used, or a conduit of masonry, properly laid, to avoid the leakage into the flume of swamp water.

It is therefore given as the judgment of the board, that if water be taken from Chautauqua lake for the supply of the city of Jamestown, the water be taken at a greater depth, not less than ten feet; that it should be carried in proper cast-iron pipes, or an aqueduct of masonry, and that before it is distributed to the city mains it should be thoroughly filtered.

THE OUTLET.

No question is raised but that the water at this point is entirely unfit for primary uses. Directly opposite the intake-pipe in the outlet that leads to the pumping well, the several steamboats plying on the lake have their landing. These boats carried last summer over 200,000 people, and in turning at the landing they stir the bottom, throwing the wash against the intake. It is claimed by the company that but twice has this water been drawn into the mains, both cases being to give greater supply for fire. It is claimed by the city that much more than this has been used, and the affidavits submitted by the city appear to bear out this statement.

It is shown by the various affidavits submitted that the yield of water by the driven wells is not sufficient to meet the demands made upon the water company. The company hesitate about driving more wells, as they fear the expense will not be met with an adequate flow of water. To obtain sufficient water, therefore, they laid the conduit to the lake.

The report of Engineer Kuichling shows that enough water for protection from fire cannot be had by the supply as now drawn from the driven wells, and from the lake. It therefore becomes necessary to allow the outlet connection for fire protection until such time as a larger and better supply can be obtained. There is no need of chemical analysis to determine the unhealthfulness of this outlet water. To know that in a basin about 160 feet wide, so shallow that the steamboats turning therein throw the mud up by their wheels, that nine steamboats daily make two turns each in this basin; that they carry about 200,000 people in the summer months, is to know that this outlet, must of necessity, be water

utterly unfit for human use. The company claim, in their affidavits, that the connection with the outlet was made with and by the consent of the then village trustees, and was put in for the protection of the town against fire. They further state it has only been used for that purpose. Accepting this as true, it is found when Mr. Kuichling was first sent to examine, that the water in the service pipes was poor in quality. It contained a great number of animalculi. These were thought to come from the driven wells, but none could be found in the driven well water. They could be found in large quantities in the outlet water. If, then, the company's statement is true, that only twice has outlet water been drawn into the mains, it goes to prove how dangerous it is to have to resort to such a source of supply for water, as six months after the introduction of this impure water its effects had not got out of the pipes. This may be partly due to the arrangements of the pipes, so many "dead-ends" being left. To a certain extent the trouble arising from these "dead-ends" could be largely overcome by small flushing hydrants being placed at each one, thereby enabling the company to thoroughly flush out the pipes. It is therefore given as the judgment of the board that there should be no connection with the outlet, but owing to the danger from fire and the inadequacy of the other sources of supply as at present used by the company, the board would advise the retention of this connection until such time as other supply could be had, and that during this period the gate or valve be so sealed that no leakage could be had, the seal to be daily inspected on the part of the city, and not to be broken by the water company unless directed to do so by proper authority, such directions to be placed in writing.

It is given further, as the judgment of the board, upon the general character of potable water, that it is not so much the question of what the water does at the time of an inspection in the way of affecting the public health, but what it may do, from the found condition of the water, as to its own purity or the purity of its sources. It is a well-known fact that impure water may be used at times with a seeming immunity from diseases capable of being caused by it, but none the less is it of menace and danger to the public health because it is impure or the sources are contaminated. The board is further of the opinion that in the discharge of its duty

in protecting the public health it does not exceed its powers when it condemns for potable uses water taken from polluted sources, as dangerous to life and health.

Your Excellency's attention is respectfully called to the reports of the chemical experts, the expert engineer's report, the objections of the water company to the jurisdiction and action of the State Board, and the affidavits submitted by both parties to this investigation, found in the appendix.

RECOMMENDATIONS.

The board, respectfully recommends for your Excellency's consideration and order:

1. That the water as supplied by the Jamestown Water Supply Company, at the time of examination by the State Board of Health, was a nuisance of menace and danger to the public health, and one affecting the health and the life of the inhabitants.

2. That no water from the outlet of Chautauqua Lake should be used for drinking or cooking purposes. That until such time as a greater supply of water is obtained by the said water company, the present connection with the said outlet be allowed to remain as protection against fire, provided, that the gate or valve of the intake pipe be securely sealed by the city, in such manner as to prevent any and all leakage or flow of the water from the said outlet into the pumping well of the said company, and that this seal be daily inspected by an officer of the city. And further, that the said seal is not to be broken unless upon an order, given in writing, from the mayor, or the president of the common council, or the chief of police. And in case the said outlet water has at any time to be used for the purpose of putting out a fire, or conflagration, and the said seal of the intake pipe valve has been broken in the manner provided for above, the said valve shall be resealed as soon as the fire or conflagration has been put out, and the said water company shall then proceed to flush or wash the several and various mains of the water system until all the water contained therein shall have been thoroughly changed.

And further, that upon the said water company obtaining a sufficient supply of water for protection from fire, from other sources than the outlet, the said intake pipe shall be taken up.

3. That if water be taken from Chautauqua Lake by the said water company to supplement the water from the driven-well supply, the water should not be taken at a point in said lake having a less depth than ten feet in the summer months.

4. That if water be taken from the said lake, it should not be carried in other than cast iron pipe, properly joined, or in a conduit of masonry, in order to prevent the ingress of swamp or surface waters.

5. That if water from said lake be taken for potable uses, it cannot be used as such unless it be first properly filtered through such filter or filter beds as can be readily, easily, and thoroughly cleansed, as often as may be necessary for the proper action of the filter or filter beds.

I have the honor to remain, sir, your obedient servant to command,

LEWIS BALCH, M. D.,

Secretary and Executive Officer State Board of Health.

ALBANY, *January* 18, 1887.

APPENDIX.

"A."

CONSIDERATION OF OBJECTIONS TO THE STATE BOARD OF HEALTH TAKING ACTION UPON THE APPLICATION OF JAMESTOWN FOR AN INVESTIGATION OF THE WATER SUPPLY, PUT IN BY COUNSEL FOR WATER COMPANY.

FIRST. The act under which the board of health is acting, provides: "At any time the Governor of the State may require the State Board of Health to examine into nuisances affecting the security of life and the health in any locality; and, in such cases, said board of health shall have all necessary powers to make such examinations, and it shall report the result thereof to the Governor, within the limits of time prescribed for such examination and report. The report of such examination, when approved by the Governor, shall be filed in the office of the Secretary of State, and the Governor may, in relation to things found and certified by the said board of health to be nuisances, declare them to be public nuisances, and order them to be changed as he shall direct, or abated and removed." Laws of 1882, section 8, chapter 308.

This order is presumptive evidence of the existence of such nuisance. Under these provisions the duties of this investigation are to be confined to the examination of nuisances "affecting the security of life and the health of" this locality. So that the result of this examination must reach the point of determining that the water furnished by the "Jamestown Water Supply Company" is a nuisance, affecting the security of life and the health of the city. An examination into any other matter is unauthorized and objected to by the company.

This statute does not vest in the board of health any discretionary power in declaring a thing a nuisance; nor does the fact of their declaration that a certain thing is a nuisance make it so. Nuisance has a well defined meaning in the law. So that the first question is:

Does the water, furnished by said company, have deleterious or detrimental effect upon the security of life and the health of our city? Can you, from the evidence you have, determine and report that the water, thus furnished, is a nuisance?

This investigation is confined to the "security of life and the health of" the city. There is no claim that it affects the security of life, otherwise than the effect the use of the water may have upon the health.

ANSWER. 1st. The action of the State Board of Health is under section 8, chapter 308, Laws 1882.

The water company object to the State Board of Health examining anything outside of the mere "nuisance" that may be complained of, and that the nuisance investigated must be one "affecting the security of life and the health." The examination must therefore show as its result that the water furnished by the company is a nuisance affecting the life and health of the city, or in other words, unless such a state of things is found, that the water must be found pure and wholesome.

They further take the ground that the State board cannot declare the water a nuisance in their discretion. That the common law definition of nuisance must be followed.

It is next asked, does the water as furnished by the company have a deleterious effect upon the life and health of the city? and the inference sought to be established is, that unless such a condition is found, viz., that the water as furnished by the company has an injurious effect upon the health of the inhabitants, the board cannot report upon it. It might be as well stated that if a person is taking poison in small doses which has no apparent effect upon his health, because he manifests at the time no active effects of the drug, the taking of that poison is not affecting his health.

The State board is to be confined in its examination to the mere facts as to whether, first, the water as furnished is a nuisance, and that nuisance one at common law; and second, the water as furnished, is it affecting the life and health of the people? I do not understand how the examination is to be conducted other than it has been done, to determine not only these points, as far as they are to be determined, but other and equally important points, viz.: is the water as furnished fit for human use; are the sources from which that water is taken such as will give safe potable water?

To take even the narrow view asked for by the company, would necessitate an investigation into the sources of supply and the character of the water, for how else could the board determine the question whether the diseases claimed to be caused by it had their origin there or elsewhere? Should the board undertake to examine the inhabitants to see whether any had been made ill by the use of the water, and on the statements made on this point, sworn or not, condemn the water as unhealthy, the company would instantly object, and with reason, that the board did not know where the water came from, and therefore could not, in fairness, decide that it was the cause of any given case of sickness unless it had such knowledge.

It is a known fact, one indisputed, that impure water will cause disease. It is also undisputed that sewage, human and animal excrement, decaying organic substances, defile water and render it dangerous for human use. Upon these known facts as data, the examination to determine whether or not the water as furnished

the citizens of Jamestown is a nuisance and has a detrimental effect upon life and health, must be conducted. The sources of supply become, therefore, important factors in the case. These sources have been found to be three, the driven wells which are found by all to be a pure and wholesome supply, although it was sought to prove they generated an evil in the way of certain algæ; the lake, whose water taken at a most favorable time, was shown by the company's chemical expert's analysis, to be suspicious and dangerous from a chemical stand point, and the outlet of the lake, concededly bad water, dangerous impure water, and which Mr. Kent swears was only intended for use in case of fire, but which various parties swear was largely used for service as it was so convenient. All evidence points to large quantities of this defiled water being sent into the mains. The claim that the algæ found in the pipes came from the driven wells, was untenable because these algæ could not be found in the driven-well water. They were, however, plentiful in the water from other sources.

Wood's Law of Nuisances says: "The term nuisance in, legal phraseology, is applied to that class of wrongs that arise from the unreasonable, unwarrantable, or unlawful use by a person of his own property, real or personal * * * working an injury to the right of another or the public, and producing such material annoyance, inconvenience, discomfort or hurt, that the law will presume a consequent damage."

Chapter 270, Laws 1885, governing the action of health boards, says they are "to receive and examine into the nature of complaints made by any of the inhabitants concerning nuisances, or causes of danger or injury to life and health; * * * to enter upon or within any plac e or premises where nuisances or conditions dangerous to life and health are known or believed to exist."

Section 8 of chapter 308, Laws 1882, requires the State board to examine into "nuisances affecting the security of life and health" whenever the governor may see fit to so direct.

The evidence shows that the water as drawn from the service pipes was disagreeable to taste and smell, causing "material annoyance" to those who could not use it in their business, (Affidavit of Edgar A. Kepler, photographer.) "inconvenience" to those who had to furnish other water for their hands to drink, (Affidavits of A. P. Sherman, Wm. Blackstone, Wm. S. Gifford, Wm. H. Boyd, etc.) "hurt" to those suffering from sickness caused by it, (Affidavits of Dr. G. W. Whitney, Dr. Henry P. Hall.)

But there is much more than the mere common law nuisance. The affidavits show that it *has* caused sickness, therefore it is a nuisance of danger and menace to the public health, and as such comes under the special laws for the protection of public health. It having caused sickness, impure water being known to be dangerous to life and health, the State Board of Health is not exceeding the limits set for it by section 8 of chapter 308, when it investigates

the sources of supply, and the character of the water as supplied by the water company, as the claim is substantiated that the water as furnished when the State board was directed to investigate, was a "nuisance affecting the life and health" of the locality.

SECOND. "Having determined the supply is a nuisance, the next question is: What occasions this nuisance? Is it caused from defects in the machinery of the works, from their peculiar construction; or is the fountain, from which the water is taken, corrupt and the water naturally and irremediably bad?

The latter determination would end the matter, as to the present source of supply; but, if the former, a remedy may be suggested."

ANSWER. The second objection of the company is frivolous. It properly asks the question what causes this nuisance? and then proceeds to ask if the machinery, its construction, or the fountain from which the water is taken, is corrupt and the water naturally bad?

Does the company mean by the "fountain" from which the water is taken, the pumping well? The objection says nothing about the *sources* of water, but innocently asks if the machinery, in some wonderful and unknown way, defiles the water.

If the water is naturally bad and beyond help, the objection goes on to state, it would end the matter, "as to the present source of supply." What does that mean? The "fountain" or pumping well, or the three sources of supply, the wells, lake, and outlet? There is no evidence anywhere that the machinery is questioned as a source of pollution. Or that the pumping well is improper.

THIRD. "In this investigation, the board of health act in a public capacity, not as the agent of or for any particular party or person."

ANSWER. Why this is put in as an objection I fail to understand. The State Board of Health is examining into the healthfulness of the water supply of the city of Jamestown. The board is not an *employé* of the city or of the water company. It has no interest in the matter, further than to do its duty in the protection of the public health. It can act but in its public capacity, as it has no private one. I suppose the objection is put in solely as a chance legal point upon which some further objection by the water company may be based against the report of the board.

FOURTH. "The law, or statute, under which they act, prescribes no special mode of action. It does not even determine what kind of proofs may be taken; nor whether under the sanctity of an oath or not; and yet, this is a proceeding by which it is claimed one's property may be condemned and abated or destroyed; that the owner of the property may be compelled, against his will, to entirely

change its condition, adding expense without limit, and he be compelled to foot the bill; and that all this may be done without the solemnity of an oath and upon hearsay statements.

To this interpretation of the law, the water company object and claim, that the "examination" contemplated by the statute means one taken under oath; and that all testimony by the board received should be received from parties or witnesses duly sworn, and in whose examination the water company has a right to participate."

ANSWER. The mode of investigation is not provided for under the law. The State board is to examine into the nature of whatever may be the complaint put before it. In this instance it is drinking water. The board, therefore, takes every method it has at its disposal to reach a proper and fair conclusion. Whether this is sworn testimony, or whether personal inspection, or inspection and report by experts employed by the board, does not change the result. The report of the board is made by it as sworn officials, and upon the recommendations in that report the Governor makes such order as may seem to him best. The law did not contemplate the creation of a court to try a cause for the purpose of deciding it to be a nuisance of danger and menace to the public health, when it established the State Board of Health. It created the Board as an advisory bureau, to advise the Governor, if he called for its aid, to advise local boards of health, and to aid in preserving the public health, by giving it power to enforce the proper action of local boards. A complaint being examined into by the State board in accordance with law, if the board finds, after such an examination, the complaint to be well founded, and the trouble complained of to be a nuisance of menace and danger to life or health the board can so find, and they having so found and declared in their opinion as the State Board of Health, that the trouble examined is a nuisance dangerous to health, it is under the law *prima facie* evidence that it is such a nuisance.

The objection goes further. It says it protests against any order given under such a report, should the report be adverse, as these objections seem to expect, which will compel the company to change their works; in other words, spend any money.

The report, under the law, could only recommend to the Governor such things as, in the judgment of the board, it considers would be necessary for the protection of the public health.

If the measures recommended for that purpose cost money to the company, it is their misfortune that sufficient care and skill were not exercised in the creating of their plant to avoid further outlay. But the protection of the public health is paramount to private interest, and if the water as furnished is found of menace and danger to the public health, then private interest must yield to public advantage.

But in this case the objection stated can hardly hold, for sworn affidavits have been submitted by both parties, and the examination of the ground and sources of supply, pumping station, flume, pumping well, etc., was made by a sworn officer of the State.

FIFTH. "No compensation being provided for the payment of property taken under said law, renders the law unconstitutional and void."

ANSWER. In this case no property is taken and destroyed; therefore the question of reimbursement does not arise.

SIXTH. "The summary proceeding, under which property is claimed to be confiscated under said law, renders the law unconstitutional and void for the reason such taking and destruction would be without due process of law."

The constitution provides:

"No person shall be deprived of life, liberty or property without due process of law." (Art. 1, sec. 6.)

"To take private property for public use, without making a just compensation to the party, is not only unconstitutional, as against a fundamental principle of government, but a violation of natural right and justice. An act of the Legislature, therefore, violating this principle, is null and void." (Bradshaw v. Rodgers and others, 20 John, 102; Taylor v. Porter and others, 4 Hill, 140.)

"The words 'due process of law,' cannot mean less than a prosecution or suit instituted and conducted according to the prescribed forms and solemnities for ascertaining guilt or determining the title to property." (Id., 147; Rockwell and others v. Hard, 35 N. Y., 302.)

Kent defines it: "Law in its regular course of administration through courts of justice." (2 Kent's Com., 13.)

I am aware that it is claimed this law is founded upon the principle of necessity for immediate protection to public health and security of life; that it emanates from the police authority of government, but that can in no case exist unless a proper case for action exists, nor even then has this body an unlimited power.

"A power given to a municipal body to abate nuisances in any manner it may deem expedient is not an unrestricted power, such means are only intended as are necessary for the public good. The abatement must be limited by its necessity, and no wanton or unnecessary injury to the property or rights of individuals must be committed." (Babcock v. Buffalo, 56 N. Y., 268.)

So, a public necessity to suppress something that is producing injury to health must exist, and the means to abate this can only be such as is actually necessary to cure the injury being done to public health."

ANSWER. The same answer would hold good here, as to the fifth objection. A summary proceeding under order of boards of health is due process of law. The Legislature in creating boards of health confers upon them power to enact sanitary ordinances having the force of law, and this under the general law of police.

"Boards of health, if invested by the Legislature with the authority so to do, have full power to restrain the use of private property and the acts and business of all persons within the State for any purpose which is incompatible with the public health." (In re Wiesells, 13 Weekly Dig., 185; Blazier v. Miller, 10 Hun, 435; Polinsky v. People, 73 N. Y., 65; Cronin v. People, 82 N. Y., 318; City of Rochester v. Collins, 12 Barb., 559; City of Watertown v. Mayo, 109 Mass., 315; People v. Hanley, 3 Mich., 330; Taylor v. The State, 35 Wis., 298; Gregory v. Mayor of N. Y., 40 N. Y., 273; Schuster v. Metropolitan Board of Health, 49 Barb., 450.)

Boards of health deal with such matters as affect the public health. They have the power to suppress and remove nuisances affecting the public health.

"Property, or any use of it in a public place, which endangers the safety, the health or the comfort of the people, is a public nuisance." (Wood on Nuisances, 73.)

The authorities quoted in the objection do not refer in any way to the action of boards of health taken for the protection of the public health. But, as said in the answer to the fifth objection, nothing in this case has appeared to justify the assumption that property is to be arbitrarily taken or destroyed.

SEVENTH. "There is no evidence in the case under consideration, showing that the water supply is dangerous to public health, or that it is a nuisance 'affecting the security of life and the health in' this locality. The proofs show that no such effect has resulted from the use of this water. It follows, therefore, that this is not a case within the jurisdiction of the board of health, upon which they have any right to report for executive action." (See the Statute of 1882, sec. 8; affidavits of Dr. Leeds and others.)

ANSWER. It seems from this objection that as far as known to the company, no case of sickness has been caused by the water, and consequently it must be pure and wholesome, no matter what its source But affidavits are submitted in which it is stated that low fevers and vomiting have been caused by the use of the water as furnished. These affidavits would go to show that the water does and is "affecting the security of life and health," and consequently the case comes clearly within the province of the State Board of Health to investigate and pass upon. (Affidavits of Drs. Whitney and Hall and Mr. E. Wilkins.)

EIGHTH. "The action of this board, under the statute referred to, is *quasi* judicial, inasmuch as their judgment or determination is

based upon evidence and conclusions arrived at from examination of proofs and witnesses. In these examinations, both parties have a right to participate by way of offering proofs and cross-examination of witnesses. An exclusion of this right is not only unjust, but unconstitutional and illegal; and a judgment based upon testimony thus taken is worthless."

ANSWER. As stated before, the State Board of Health is an advisory body and not a court. It cannot therefore examine witnesses under oath, permit cross-examination by counsel, or give judgment which carries with it punishment. The board passes its judgment after examining a given case upon the questions involved therein affecting the security of life and health. In such cases as the one under consideration, the judgment of the board is confirmed or set aside by the action of the Governor upon the recommendations made, which then becomes law as provided for by the law.

NINTH. "By consenting to put in affidavits, after the decision of the board, they had no right to swear witnesses or give the parties oral examinations; the witness being sworn, the Jamestown Water Supply Company waives no right it before had to object to the jurisdiction or mode of proceeding adopted by the board, and here reasserts and maintains its objections that said board has acted without jurisdiction, contrary to the spirit and intent of the law, and irregular in its procedure."

ANSWER. It was by the express request of the counsel of the water company that extra time was allowed in which affidavits might be put in, the counsel objecting to any report being made which was based upon unsworn statements. In this objection the company now protest against action on these affidavits, and evidently appear to consider the sworn statements as of no more reliance than the unsworn.

TENTH. "The contract, referred to by the city council, has no place in this investigation, other than to show the great injustice to the water company, when it is sought to try the merits of this controversy in this unjust and illegal way. I apprehend both the city and water company will take care of their respective rights, as to any contract, when properly called upon in any legitimate proceeding. Suppose an order be made cutting off the source of supply and serious conflagration visits our city, where will the blame lie? These things should be well considered before this board assumes to pass upon obligations or rights of either party."

ANSWER. The matter of the contract between the city and the water company has no bearing upon the question the board has to pass upon. No questions as to the nature of the contract have been asked by the board. It has confined itself solely to the questions within its jurisdiction.

ELEVENTH. "Upon the merits of this controversy the only thing to be considered is as to the supply from the 'crib.' The connection with the outlet is not in question, as no water for domestic use is to be taken from there, and the company is ready to sever the connection whenever the common council consents or directs it to be done. The wells are admitted to be good and as producing good, pure water. What about the conduit to the 'crib?' No one proves the water to be injurious to health. It may taste bad and smell bad, but this is not enough to pronounce the supply a nuisance 'affecting the security of life and health.' Unless the evidence shows that public health is jeopardized this board has no jurisdiction to pass upon the question. Expert chemists and local physicians have given their testimony as to the effect of this water upon the people, and as to its quality for domestic use." (See the affidavits of chemists and physicians.)

ANSWER. In this objection the company seek to confine the investigations of the board to but one point, viz.: the "crib" in the lake. The outlet water is not to be considered, as the objection says, "no water for domestic use is to be taken from there." Several affidavits have been put in to show that outlet water was repeatedly drawn into the pumping well, and at times when no fires were in progress. If this fact is established by these affidavits the water thus drawn could only be meant to supplement the small supply of good water from the driven wells. But supposing the outlet water is not to be used for "domestic" purposes, only for fire. According to the company's statements it has but twice been used for fire, and yet six months after such use animalculi, similar to those found in the outlet, are found in great quantities in the service pipes, and the water, as found, had to be taken for "domestic use." The argument that water "may taste and smell bad" does not cause that water to be a "nuisance affecting the security of life and health," when the bad taste and smell cause persons to vomit, and the expert chemist of the company shows by analysis that this water which "may taste and smell bad" to contain nearly double the amount of albuminoid ammonia considered by authorities to be suspicious for wholesome drinking water, is an argument of no weight. If the water, as is sworn in affidavit, causes a person to vomit, it certainly causes some "material annoyance, inconvenience and discomfort," and is of more or less danger to health, and conditions like these come under the definition of a nuisance.

TWELFTH. "It will be seen from the affidavits that the construction of the pipe-laying was somewhat at the suggestion of the old village of Jamestown, especially as to the 'dead-ends' and connection at the outlet. The city is the complaining party here. If the alleged difficulty arises from these acts of the city (village) it cannot now take advantage of what it has advised or caused to be done. But is it unusual to find water, taken from different

parts of the pipes, in different sections of the locality, to ›e different in taste or color? Here are fourteen miles of ›ipe, scattered around the city, on its hills and in its valleys. Would t be unusual to find difference in the water? This all comes from he same supply. When it enters the pump it is the same; but vhen delivered at the service-pipes it is different. This does not how, necessarily, any trouble with the source of supply; but that rom some cause portions have become bad since entering the pipes. Should the works be condemned for this? The difficulty in this ase has been explained by chemists, that it has arisen from causes or which the company is not to blame. Remedies have been pplied and improvement is perceptible. Why not continue improve- ient? This difficulty, if it be that, is not within the jurisdiction f this board, as it does not endanger health; but it may have some- hing to do with the contract, which is not here for determination."

ANSWER. This objection would seem to admit, on the part of the ompany, that the water is bad, and they seek to put the cause hereof upon the manner of laying the service-pipes. If this is so, iz., that the sources of supply are all pure and wholesome, and he trouble with the water is caused by a faulty system of distribut- ng pipes, the water being bad, and according to the affidavits, ausing sickness, the question asked in the objection becomes perti- ient: "Why not continue improvement?" The board fully agrees vith this question, and is willing to aid the company with its advice nd experience to the full of its power, in order to continue this mprovement. Whatever the question may have to do with the ontract is not for the board to pass upon.

THIRTEENTH. "The unfairness of treatment from the committee s seen from the answer of the chairman to the letter of C. R. Lock- rood, in which the committee decline to exchange affidavits. (See orrespondence between Booty and Lockwood.)

"Justice can hardly be meted out to parties in this way. The oard decide they have no authority to administer oaths, and no ower to compel an examination under oath; and arrangement is nade to submit affidavits; but the city council, by its committee, lecline an examination of its proofs by the party whose property hey seek to confiscate, abate or destroy, thus compelling the com- any to submit to a judgment without knowing the proofs on which he judgment is founded or the evidence presented against it. Is his acting according to the integrity of our government? Is this giving a party his day in court? Is this condemning one by due rocess of law?

"The Jamestown Water Supply Company protests against such ction.

"This allegation of wrong is not at the door of the water supply ompany, for it voluntarily offered an examination of its proofs, vhich was declined." (See Lockwood's affidavit of letters.)

ANSWER. The company complains of unfairness in that the committee of the common council would not exchange affidavits. I fail to see what the State Board of Health has to do with this fact. But the company, further on in this objection, makes it a basis for protest against the action of the board, because they have not had their "day in court." It has the same answer as stated before, viz.: The board is not a court. It was voluntary upon the part of the city and on that of the company to submit affidavits at all, and was only done because the company requested it. With requests or denials that have passed between the water company and the city authorities, in regard to these affidavits, the State board has nothing to do.

FOURTEENTH. "From the construction of the law, as interpreted by your body, greatest injustice might be done, in that affidavits could not be compelled from any one, while opposing party could get all desired from friends. This may be owing to an imperfect law; but the fact shows the great wrong there is in disposing of property rights in this way."

ANSWER. From this objection the company seem to consider all the affidavits more or less perjury, as they cannot be compelled. The State board cannot take upon itself to decide whether affidavits are false or true. As many parties have made affidavits for both sides in this controversy, the board can but take them all into consideration.

FIFTEENTH. "The affidavits show these complaints of this water are exceptional, not general; that the water, as a general thing, is good; but that, after it enters the pipes, from some unknown cause in certain localities, it runs some dirt for a short time; but this is not a permanent or incurable defect, and will soon be entirely remedied.

"The most this commission could do is by way of suggestion as to remedies; but it has no jurisdiction or right to declare the said water supply, or any part thereof, a nuisance, affecting the security of life and health in this locality.

"From the samples sent by the company, it will be apparent that the dirty samples forwarded by the city must have been procured with extraordinary care. It is absurd to suppose these exhibitions, so sent by the city, are fair representation of the drink obtained from our water supply, else the statements of men, whose characters stand above reproach, herewith forwarded, must be declared deliberate and intentional falsehoods. Not only this, but statements voluntarily made; for, under the ruling, there was no compulsion.

"We most respectfully ask that deliberation, caution and judgment shall unite in the examination to be given this matter; and, above all, that justice and right shall be meted out to all parties in this unfortunate and, to us seemingly, unnecessary controversy."

ANSWER. In this objection the company pass upon the contents of the affidavits they say they have not had copies of.

The company further states that all the board can do is to make suggestions. The board declines to be instructed in its duty by counsel for the water company.

The objection further goes on to say that the samples of dirty water sent by the city must have been "procured with extraordinary care." The samples sent by the water company may also be said to have been selected in the same manner. The board cannot enter into such questions. That "deliberation, caution and judgment shall unite in the examination of this matter," the water company may rest assured. The board will endeavor to make such recommendations as will be just and right, and fulfill the design of the creators of the board in putting in its care the protection of the public health.

LEWIS BALCH,
Secretary.

"B."

REPORT ON JAMESTOWN WATER SUPPLY BY EMIL KUICHLING, C. E.

ROCHESTER, N. Y., *September* 30, 1886.

DR. LEWIS BALCH, Esq., *Secretary of the State Board of Health, Albany, N. Y.*

DEAR SIR.—In accordance with your instructions of the twenty-seventh ult., to examine the water supply of the city of Jamestown, Chautauqua county, N. Y., and report to you such recommendations as may appear necessary for the conservation of the purity of the potable water furnished to the inhabitants of that city from the water-works conduits, I beg to say that on the first, second and ninth instant, I made a careful examination of the said water-works and the sources of supply therefor in company with Mayor O. F. Price, Aldermen E. R. Booty, John G. Wicks, Messrs. A. F. and W. A. Kent, of the Water Supply Company, and other interested citizens; and after a thorough consideration of all of the many complicated questions presented in this case, I would herewith submit the following

REPORT.

The city of Jamestown was incorporated as a municipality this year, and, according to an enumeration made early in the season, has a population of about 13,800. Beautifully situated on the outlet of Chautauqua lake, about two and one-half miles from the foot of the latter, with excellent railroad facilities and considerable water-power, it affords every evidence of prosperity and future growth. At its present rate of increase, it is fair to presume

that in the course of the next decade, its population will rise to about 25,000. The area included within the city limits is about 5,600 acres, upon which nearly seventy-five miles of streets are already laid out and more or less thickly studded with, in the aggregate, 2500 dwellings and about 600 places of business. In 1881, the question of a public water supply was earnestly considered and agitated, with the result that early in 1882, the construction of a system of water-works was undertaken and carried out by a private corporation, known as the "Jamestown Water Supply Company." The works were practically completed on July 15, 1882, and the community entered into a contract with said company to furnish an abundant supply of pure and wholesome water for general public purposes during a period of twenty-four years, at the rate of $6,000 per year, this annual payment to be increased a certain amount for each additional fire hydrant subsequently to be set by the company, so that the present annual payment has increased to $6,200. The works are built and operated on the "Holly" or direct pressure system, the water being pumped directly into the distributing mains without the intervention of an elevated reservoir or stand-pipe. The sources of supply at present are *three* in number, as will be more fully detailed below, since it is with reference to *two* of the three available sources that more or less well-founded objections have been raised by a number of citizens. By the courtesy of the officers of the water company, I am enabled to submit the following statistics relating to the works and their operation: There are about fourteen miles of distributing mains laid in the city streets, to which 104 fire hydrants are attached, and forty-two stop-valves inserted; the number of services or house-connections in use is about 600, and during the past summer, about 1,000,000 gallons of water per day have been pumped into the mains; the number of persons actually supplied with water from the works is not known, but it probably does not exceed 4,000; very little of the water is used for manufacturing or power purposes, and fires are not of frequent occurrence, so that the domestic consumption amounts to the exceedingly high rate of from 250 to 300 gallons per head per day; the highest elevation to which the water is pumped in the city is 185 feet above the low-water level of the outlet at the pumping station; the pumping cylinders of the large engine are about seventeen feet above the same level, and those of the small reserve engine about twenty-one feet; the large engine is of the Holly quadruplex type and has a guaranteed capacity of 3,000,000 gallons per day, although by increasing its speed, a rate of fully 4,000,000 gallons per day can be obtained for comparatively short periods of time; the small reserve engine is a Worthington duplex fire pump, size E, capable of delivering 700,000 gallons per day in cases of emergency, but rated by the manufacturer for regular daily work at about 432,000 gallons per day; there are two distinct sets of

tubular driven wells, three inches in diameter, one set of twelve such wells about eighty feet deep, immediately at the pumping station, which discharge into the large suction well, while the other set consists of nineteen similar tubes, driven on the average 110 feet below the surface of the ground at some distance from the pumping station, and connected together into a single large wrought-iron tube, ten inches in diameter and 2,488 feet long, which, in turn, is connected by means of a valve directly to the suction pipe of the pumps; in driving the latter set of wells, the formations penetrated were as follows: beginning at the surface, a depth of from sixteen to twenty feet of muck and loam, then strata aggregating eighty feet in thickness of firm clay and quicksand, and finally from five to ten feet in depth into a bed of water-bearing gravel.

The plan of the distributing mains in the city streets shows a large number of "dead-ends," or lines of pipe closed up at one extremity. In regard to the feasibility of eliminating these dead-ends by means of connecting pipes to secure free circulation of the water, the statement is made by the company that such a course is practically impossible, since many of these ends are separated from each other by long distances, and in a majority of the cases the connecting pipes would have to be laid through private premises. It is further stated that the company objected strenuously to the plan of laying these long stretches of pipe without connections to secure circulation, but that they were required to do so by the then village trustees in order to secure as extensive a fire protection as possible with the stipulated number of miles of street mains. From what I saw of the system of pipe distribution in the company's office, as well as from what I apprehend to be the source of the trouble with the water, it is my opinion that no great improvement in the quality of the water contained in the pipes would follow from a connection of these dead-ends. Such work is necessarily expensive and unremunerative, and the cost can be far more profitably invested in other efforts at improvement.

SOURCES OF SUPPLY.

As already mentioned, the works have been built in such manner as to allow the water supply to be drawn from three separate and distinct sources, namely: First. From deep-seated ground water in a stratum of gravel, 80 to 100 feet below the surface, by means of two sets of tubular driven wells. Second. From the foot of Chautauqua lake, through a twenty-four inch pipe of spiral riveted sheet-iron, coated with coal tar pitch, and buried from six to eight feet below the generally level surface of a peaty swamp, extending from the pumping station about two miles in a direct line to the foot of the lake; and third, from the outlet of Chautauqua lake, close to the pumping station and directly opposite the steamboat landing, by means of a sixteen-inch cast iron pipe, controlled by a

stop valve, and terminating in the suction well of the pumps. The general arrangement of the various pipes, wells, structures, etc., about the pumping station, and their relations to the aforesaid sources, are shown upon the accompanying diagram, plate No. 1, which, for the sake of greater clearness, has been drawn without reference to scale. Before proceeding with the discussion of these sources, it will perhaps be desirable to give here a brief description of this locality. The pumping station is built on the slope of a low ridge, defining the lake basin on the western side of the city, and immediately opposite the steamboat landing. A highway bridge over the stream, as well as a stony reef across its channel near this point, has fixed the limit of navigation. Hills rising more or less near to the outlet on the east and north plainly mark the former shores of the lake in these directions. Between the high grounds thus indicated and the present foot of the lake, there is a large area of flat, marshy land, about two miles long and, on the average, one-half mile in width, through which the outlet has worn a shallow and tortuous channel at least three miles in length. This land is covered with a deep layer of muck and peat; and as its surface is only about two feet above the low water level of the lake and outlet, and as in times of high water it is almost wholly submerged, it forms practically a large swamp, overgrown with trees, shrubs and various kinds of swamp grasses and plants. From the evidence of trustworthy witnesses, it was found that the statements of the Water Supply Company, with reference to the nature of the geological formations underneath this swamp, were fully substantiated. Below the steamboat landing, the valley immediately narrows, and the stream has a comparatively rapid fall, thus affording at a number of places in the city considerable water power. In order to reclaim as much land as possible from the large marsh above mentioned, numerous drainage ditches into the outlet have been constructed, and through these the surface waters from the adjacent highlands find their way, in a more or less polluted condition. Further particulars respecting the outlet will be found below. In front of the pumping station is a large circular suction well for the pumps, twenty-one feet in diameter and twenty-one feet deep. The side walls are of rubble-stone masonry and the bottom is formed of thick courses of planking. Five three-inch tubular wells are driven in the bottom of this suction well to a depth of about eighty feet, and of these three were found to be flowing copiously. The interior of the large well was found to be very clean, and the water at that time free from taste, smell or color. Up to the present summer the top of the well was left open, but at the suggestion of Prof. A. R. Leeds, of the Stevens Institute of Technology, who was recently consulted by the company in regard to the quality of the water furnished, a substantially tight roof has been built over it, so as to practically exclude dust, animals and light. A few rods westerly from this well, and connected with it by means of a six-

teen-inch cast-iron pipe, a small open reservoir or storage basin was constructed by the company. This basin is about 100 feet long and forty feet wide on the bottom, with sides sloping at the rate of one foot vertical to one foot horizontal, and neatly paved with field and quarry stones. Its depth is about eleven feet, but probably no more than a depth of nine feet of water can be stored in it, in which event its capacity will be about 360,000 gallons. At the time of my inspection it contained a depth of not more than fifteen inches of water, and the bottom appeared to be gravelly clay, which was covered in many places with confervoid growths. A well-defined water mark on the paving showed that it was made when the water was about five feet deep. Five three-inch tubular wells were found driven in the bottom of this basin, but none of them were seen to be flowing. The only visible source of supply was a small spring which issued from the pavement at one corner and the flowing wells in the large suction well above described. It is stated that two additional three-inch tubular wells were driven between the suction well and the reservoir, and then connected with the sixteen-inch cast-iron communicating pipe, but as this pipe was deeply buried no knowledge of the condition of these two tubular wells could be obtained. The small fountain in the middle of the reservoir is supplied with water from the force main, and is purely ornamental. As the tubular wells have ceased flowing, and since the bottom of the reservoir is very near the level of the low-water surface in the lake and outlet, this structure seems to have outlived its usefulness for water-works purposes.

On the diagram mentioned, the pipe leading to the second set of nineteen three-inch driven wells, the conduit to the lake, and the direct connection with the outlet, will be found appropriately marked, and we will now proceed with the consideration of these several sources, in the course of which further descriptions must necessarily be introduced.

It appeared to be the original design of the company to obtain substantially the entire supply of water from the group of twelve tubular wells in the large suction well and small storage reservoir, above mentioned, all of which formerly flowed copiously, together with the discharge of another group of five similar wells, located at some distance from the pumping station.

This second group was originally combined into a single collecting pipe, joining with the sixteen-inch cast-iron pipe leading from the suction well to the outlet. Two stop-valves in the latter pipe served to control the flow of these seventeen driven wells into both the reservoir and the suction well, or into the outlet in case the discharge from the wells should prove greater than was desired; and conversely, in the event of a failure on the part of said wells to furnish sufficient water in emergencies, the same valves would fully regulate any supplementary volume of water taken directly from the outlet. A brief study of the diagram, plate 1, will suf-

fice to explain these two functions. The officers of the company assert emphatically that the seventeen tubular wells formerly afforded an abundant supply of water by simple flowing, and that the outlet pipe was laid only as a matter of justifiable precaution in case of a large conflagration; also, that it has been used to obtain water from the outlet only at rare intervals. As the consumption of water in the city increased, however, it was found that the yield of the said seventeen driven wells was diminishing considerably, so that another source of supply had to be secured. With this view, the company caused a twenty-four-inch sheet-iron spiral riveted pipe to be laid from the bottom of the suction well to the foot of Chautaqua lake, a distance of 10,200 feet, the water to be taken from a timber crib located about 200 feet from the nearest shore. Much difficulty was experienced from the tendency of the thin metallic pipes to collapse under the weight of the swamp muck in which it was buried, and the company then resolved to abandon this project temporarily and to drive an additional number of tubular wells into the water-bearing stratum of gravel 100 feet below the surface. A line of strong twelve-inch pipe, 400 feet long, was accordingly laid from the main suction pipe in the pumping engine house, westerly toward the lake and parallel with the twenty-four-inch sheet-iron pipe; near its termination, a suitable sand-arresting well, with strainer, was inserted, and the second group of five tubular wells above mentioned was permanently disconnected from the sixteen-inch outlet pipe and joined to the end of the twelve-inch pipe, as indicated in the diagram; the latter was then reduced to a heavy ten-inch wrought-iron tube and continued westerly, as before, for a distance of 2,488 feet, along which a third group of fourteen three-inch tubular wells were driven and connected. On this length of 2,888 feet of twelve-inch and ten-inch suction pipe there are now, accordingly, nineteen driven wells, some of which flowed more or less copiously. For a short time sufficient water was obtained by pumping from this second set of wells, together with the yield of the first group of twelve wells; but it was discovered that the flowage soon ceased in consequence of the great draught caused by pumping, and that the water in the driven wells would barely rise therein to sufficient height to make pumping practicable at the existing elevations of the pump cylinders. In this extremity, the project of securing water directly from the lake through the temporarily abandoned twenty-four-inch conduit was revived, the collapsed sheet-iron pipes were taken out and replaced with a wooden conduit wherever necessary, and the lake line was finally opened about ten days ago into successful operation, thus relieving the company of all embarassment with respect to *quantity* of water, without resorting to the outlet. Of the *quality* of this lake water, more will be said below.

COMPLAINTS.

Having now briefly described the existing sources of supply for the Jamestown water-works, and furnished sufficient data wherewith to form an estimate of the demand now made upon them, as well as of that which will probably be made upon them in the future before the expiration of the contract with the city, it is proper to refer to the complaints which have been made by a number of residents during the past two or three years concerning the quality of the water supplied to consumers by the company. For about a year after the practical completion of the works in 1882, and whilst the driven wells then in existence continued to furnish sufficient water to meet the demands of the relatively small number of consumers, no trouble with the water was discovered; but after this number had gradually increased quite appreciably and the yield of the wells at the same time diminished, a marked deterioration in the quality of the water furnished began to be noticed, and it was suspected that the company supplemented its driven-well water by copious draughts upon the outlet. From the evidence which I have been able to obtain, it seems that the water delivered from the distributing mains had a disagreeable taste and odor, and also a repulsive appearance; that to the taste it was "woody," "swampy," "fishy," "nauseating," and to the smell, "bad," "like cistern water," "like a stagnant pool," "offensive," etc., while to the sight it was "badly discolored," "turbid," "thick," "muddy," "containing worms and lizards," etc., according to different narrators. A sample collected in the early part of this year and carefully preserved in a glass fruit jar, exhibited a large deposit of flocculent matter, apparently of vegetable origin and resembling closely the precipitate formed in water containing the smaller species of *algæ*. As the owner did not wish to surrender this sample for further examinations, no additional facts concerning it can now be given. It is also alleged that in seasons when the least amount of water is pumped by the company the quality of the supply is greatly improved, and that as the quantity of water is increased, its quality is reduced perceptibly; hence it is inferred that all deficiencies in the yield of the driven wells are made up by taking water from the outlet, and that the manifest impurities in this stream have caused the disagreeable taste, smell and appearance in the city water. Rumors of this character have greatly alarmed the citizens of Jamestown, and have finally led to the investigation of the matter by your board, at the Governor's request. It should have been remarked previously that the bad taste and odor of the water furnished by the company has appeared at intervals of more or less extent during the entire period of two or three years, generally disappearing in winter and returning again with the late spring and early summer; also that the opinion was, and still is, quite prevalent among the citizens that this offensive taste and smell is due to the presence of decomposing animal matter in the water of the outlet, and not to any substance of vegetable origin in the waters of the driven-wells.

In reply to these accusations, the officers of the company deny that in former years any considerable quantity of water from the outlet was pumped into the city mains, and maintain positively that, with only two exceptions of a short time each during large fires on February 1 and July 10, 1886, the water from the outlet has not been used as even a partial source of supply from June, 1885, up to the present time; also that the bad taste and smell of the water furnished is caused wholly by the presence of harmless *algæ* which have developed unexpectedly in the driven well supply. In support of their assertions, the water-works officials point to the analyses and reports of several eminent chemists, who investigated the matter at the instance of various parties. A resume of the work done by the chemists in this case is as follows:

CHEMICAL ANALYSES.

On December 31, 1884, Prof. J. Tingley, of Allegheny College, Meadville, Pa., personally collected samples of the water from the distributing pipes for chemical analysis, and in his report he states that "the water drawn from the distributing pipes and from the reservoirs is not unwholesome, but is better than the average water of cities. * * * My analysis shows that chlorine and free ammonia are present in minute quantities, and traces of albuminoid ammonia, but all are far within the limits separating wholesome from unwholesome water."

On June 25, 1885, during a period when the officers of the company admit that some water was being taken from the outlet to make up the deficiency in the supply from the driven wells, the local board of health collected three samples of water from the mains and sent them to Prof. Willis G. Tucker, of the Albany Medical College, for analysis.

The three samples were mixed together and analyzed with the following results:

Color in two-foot tube, transparent, light greenish tint, odor at 100 degrees F....................	None.
Chlorine in chlorides, in one U. S. gallon.........	0.409 grains.
Phosphoric acid in phosphates....................	None.
Free ammonia, parts per 100,000	0.0040
Albuminoid ammonia, parts per 100,000.	0.0055
Oxygen absorbed, parts per 100,000 after 15 mins..	0.0453
Oxygen absorbed, parts per 100,000 after 4 hours.	0.0680
Hardness, = grains carbonate of lime, per gallon, before boiling..............................	4.33°
Hardness, = grains carbonate of lime, per gallon, after boiling..............................	2.79°
Total solids, dried at 220° F. in one U. S. gallon...	8.17 grains.
Organic and volatile matter, in one U. S. gallon...	2.92 "
Mineral matter in one U. S. gallon...............	5.25 "

"From the above results I should consider the water of satisfactory purity for drinking purposes. * * * The general appearance and odor of the water are good. Amount of chlorine small, as also of free ammonia and albuminoid ammonia, all of which are more largely present in waters which are polluted to any considerable extent by sewage. Amount of oxygen absorbed is also small, and indicative of freedom from much organic matter. * * * While it can never be asserted from the results of a chemical analysis that a water is *necessarily* wholesome, the results in this case prove that this water is not largely polluted, and the probability is that it may safely be employed."

On December 14, 1885, Prof. W. C. J. Hall, of Jamestown, collected from the city mains three samples of water, mixed them together in equal proportions, and sent the mixed water to Dr. Walter H. Kent, chemist to the Brooklyn Board of Health, for examination. The report of Dr. Kent is as follows:

Free ammonia	0.003	parts	per	100,000
Albuminoid ammonia	0.006	"	"	"
Total solids, dried at 100 C	15.56	"	"	"
Loss of solids on ignition	3.96	"	"	"
Chlorine	2.20	"	"	"
Salt, calculated from chlorine	3.60	"	"	"
Oxygen absorbed, after 15 minutes	0.088	"	"	"
" " " 4 hours	0.184	"	"	"
Hardness before boiling (= 8.5°), expressed as calcium carbonates	12.100	"	"	"
Hardness after boiling (=7.7°) expressed as calcium carbonates	11.000	"	"	"

A qualitative test showed the absence of nitrites, and the presence of only a trace of nitrates. * * * A similar test of the solid residue after ignition showed it to consist mostly of calcium carbonate, with, of course, a small quantity of iron, alumina and magnesia. * * * An excess of chlorine, when accompanied by a large amount of albuminoid ammonia, is generally taken to indicate contamination of the nature of sewage. As the amount of chlorine in this case is nominal, and the albuminoid ammonia low, the water is above suspicion in that respect. * * * The amount of free ammonia and nitrates here found is relatively small, and the inference is that the sources of the water are free from organic impurities. * * * As the result of this mathematical comparison with other waters, I should say that it compares well with waters which are considered good, and that as compared with ordinary *well* waters, it is far superior."

The last chemical examination of the city water was made from a number of samples collected personally by Prof. Albert R. Leeds, of the Stevens Institute of Technology, Hoboken, N. J., on May 22, 1886. The inspection made by Prof. Leeds at the same time

was very thorough, and the analysis conducted in his laboratory afterwards treated the subject from not only a chemical, but also a sanitary and biological point of view. The following extracts from his long report to the water supply company are herewith submitted: "At the time when I visited Jamestown, and personally examined and collected samples of its water supply, I found that the water in use is derived entirely from two sources. The first source is a system of driven wells, fourteen in number, which pass downward through an impermeable stratum of clay sixty feet in thickness, into a bed of gravel lying something over 100 feet below the surface." (Note by E. K.—These wells are on the long ten-inch suction pipe, above described, westerly from the pumping station. Since May 22, 1886, the company have driven and connected with said pipe five additional tubular wells, making nineteen such wells now on said pipe, as above stated.) The second source is a similar system of driven wells, twelve in number, drawing the water from a gravel bed lying beneath the clay stratum, at a depth of sixty feet below the surface. The thick stratum of clay lying below the surface muck and soil, and everywhere covering the gravel water-bearing stratum, might naturally be expected to prevent the surface water and impurities from finding their way down into the gravel. This expectation has been verified by analysis, there being no evidence of the presence of any surface impurities in the waters of the driven wells themselves. * * * I was surprised at the unusual clearness, excellent taste and low temperature of this water. Whilst the temperature of the outside air was eighty-eight degrees, the temperature of the water in the sand-well was only forty-eight degrees. * * * A very careful inspection of the driven wells revealed in them no vegetable growths, and the microscopical and biological analyses subsequently made in my laboratory demonstrated the entire absence of any organisms detrimental to the excellence or purity of the water. I give below a certificate (No. 987) of a sanitary analysis of the water in these wells as delivered in the sand-well into which all the fourteen flow before emptying into the pump-well. * * * Furthermore, the water is much more highly charged with oxygen gas than is usual in a water coming from so considerable a depth below the surface of the ground. * * * The finding of this large percentage of dissolved oxygen is important, as it proved that the water in the driven wells is *living* water, and as showing that the great thing to be accomplished is merely the keeping the water after it comes out of the driven wells in the same lively, sweet and wholesome condition as it is in the wells themselves. The accompanying analysis of the driven-well water * * * does not show the presence of any deleterious mineral substance, nor does it throw any light upon the origin of the disagreeable taste and smell sometimes observable in the water after it has been pumped into the distributing mains. * * *

WATER ANALYSIS No. 987.

Color, 0; taste, pleasant; smell, none.

Free ammonia	0.003	parts in 100,000
Albuminoid ammonia	0.007	" "
Oxygen absorbed (permanganate)	0.130	" "
Nitrites	0.0032	" "
Nitrates	0.235	" "
Chlorine	0.900	" "
Total hardness	11.90	" "
Permanent hardness	7.00	" "
Temporary hardness	4.90	" "
Total solids	17.50	" "
Mineral matter	13.50	" "
Organic and volatile matter	4.00	" "
Oxygen dissolved in one liter	5.53	cubic centimeters.
Carbonic acid dissolved in one liter	2.44	" "
Nitrogen dissolved in one liter	11.53	" "
Total gases dissolved in one liter	19.50	" "

ANALYSIS OF THE MINERAL MATTER CONTAINED IN THE ABOVE WATER, COMBINED TOGETHER AS THE FOLLOWING SALTS:

Potassium sulphate	0.384	parts in 100,000
Sodium sulphate	0.297	" "
Sodium chloride	1.507	" "
Magnesium carbonate	2.458	" "
Calcium carbonate	4.288	" "
Calcium sulphate	1.241	" "
Ferric phosphate	0.124	" "
Ferric oxide	0.178	" "
Clay	0.568	" "
Total	11.045	" "

It will be seen that the water has no color and no smell. As drank directly at the well, its temperature being only forty-eight degrees its taste was delicious; and even after keeping for a number of days in warm room its taste was pleasant, and the sample gave out no odor. The amounts of free and albuminoid ammonia and of required oxygen are small, whilst the amount of oxygen held in solution in the water was unusually large. * * * I have no hesitation in pronouncing this to be good and wholesome drinking water. * * * After the driven-well water finds its way into the pump well and reservoir, a very important change occurs. Largely through the influence of light, and favored by the increase of temperature in the water when warmed by the atmosphere, a considerable growth of vegetation sets in. This development of vegetation is due to purely natural causes, for which only nature is to blame, but it is the sole cause of the unpleasant taste and smell subsequently acquired by

the water in the distributing mains. This vegetation is such as flourishes in very pure waters, a microscopic examination revealing the presence of several species of Diatomaceæ, * * * Protococcaceæ * * * and Lynemaceæ, including different species of spirogyra. In the process of growth, these plants secrete slimy masses, or, under favorable influences of warmth and sunlight, may develop with astonishing rapidity into extensive masses of green felt. * * * Whilst actively growing they give no trouble, but presently they begin to decay, and each decaying mass becomes the home of other plant organisms like the bacilli and bacteria, together with rhizopods and infusoria, which rapidly grow and multiply. All of these organisms, and more especially the bacilli and infusoria I found in large numbers in the jars in which the specimens of water plants were preserved in my laboratory. Along with their growth, and with the decay of the algæ, the water in these jars became extremely offensive. * * * In the water mains all of these plant organisms perish out of contact with light and oxygen. * * * A great deal of iron rust and many filaments of dead algæ were found in the water of the mains, but no living plants. In decaying these plants affect unpleasantly the taste and smell of the water and deteriorate its quality." * * *

Prof. Leeds was at the same time also requested to examine the water of Chautauqua lake, at the location of the timber, crib or intake, previously built by the water supply company. This water had then no smell and a pleasant taste, and in his report Prof. Leeds remarks that "instead of being impure and unpalatable, the water of Chautauqua lake (taken personally at the inlet pipe of the crib) is so good that there should not be the slightest hesitation on the score of wholesomeness or purity in employing this water, should the supply from the driven-wells at any time prove inadequate, or should the taste and smell of the water in the mains become temporarily offensive. A supply of good and wholesome water, such as that contained in Chautauqua lake, would be justly considered by most of the cities of the United States at the present time as a great boon, since in both quality and purity this water is superior to that actually in use in these cities with but very few exceptions. * * *

WATER ANALYSIS NO. 989.

Color, 1.0; taste, pleasant; smell, none.

Free ammonia	0.003	parts in	100,000
Albuminoid ammonia	0.017	"	"
Oxygen absorbed (permanganate)	0.270	"	"
Nitrites	trace	"	"
Nitrates	0.0384	"	"
Chlorine	0.20	"	"
Total hardness	7.70	"	"
Permanent hardness	5.50	"	"

Temporary hardness	2.20	parts	in 100,000
Total solids	6.60	"	"
Mineral matter	4.20	"	"
Organic and volatile matter	2.40	"	"
Oxygen dissolved in one liter	3.87	cubic	centimeters.
Carbonic acid dissolved in one liter	1.19	"	"
Nitrogen dissolved in one liter	12.88	"	"
Total gases dissolved in one liter	17.94	"	"

ANALYSIS OF THE MINERAL MATTER CONTAINED IN THE ABOVE WATER, COMBINED TOGETHER AS THE FOLLOWING SALTS.

Potassium sulphate	0.0794	parts	in 100,000
Potassium chloride	0.0686	"	"
Sodium chloride	0.2745	"	"
Calcium carbonate	1.6360	"	"
Calcium sulphate	0.6256	"	"
Magnesium carbonate	1.0316	"	"
Ferric phosphate	0.0357	"	"
Aluminum and Ferric oxides	0.1318	"	"
Silicic anhydride	0.2799	"	"
Total	4.1631	"	"

"I have been emphatic in pointing out that the analyses show the water of Chautauqua lake to be of wholesome and potable character, but I should not advise its substitution for the driven-well water, for the latter is unquestionably superior in quality to the lake water, and it appears to me that the company adopted the best and most commendable course in taking, as the source of supply, a water so excellent, pure and in every respect palatable as that contained in the driven-wells; and although this excellent character has hitherto been deteriorated by natural agencies, bringing about the decay of aquatic plants in the distributing mains, yet I believe this misfortune is capable of being effectually remedied." Prof. Leeds then suggests that the large suction well be covered to exclude light, dust, etc., which was done, as already stated; also, that the reservoir be covered, or else that the inlet from the reservoir into the suction well be protected by a filter of fine asbestos cloth, or similar filtering media, which latter suggestion was carried out with strainers of fine wire cloth, backed with cotton-flannel; and finally, that a free circulation of the water be established by connecting the "dead-ends" of the distributing mains together, which is impracticable, for the reasons given above.

It should also be mentioned that Prof. Leeds collected and analyzed samples of water from the "dead-ends" of street hydrants, whence an exceedingly marked deterioration of the driven-well water was observed. The results are as follows:

"WATER ANALYSIS No. 988.

"Color, 0; taste, unpleasant; smell, unpleasant.

Free ammonia	0.021	parts in 100,000
Albuminoid ammonia	0.016	" "
Oxygen absorbed (permanganate)	0.30	" "
Nitrites	Trace	" "
Nitrates	0.058	" "
Chlorine	2.25	" "
Total hardness	10.00	" "
Total solids	21.10	" "
Mineral matter	17.00	" "
Organic and volatile matter	4.10	" "
Oxygen dissolved in one liter	1.96	cubic centimeters
Carbonic acid dissolved in one liter	2.44	" "
Nitrogen dissolved in one liter	11.90	" "
Total gases	16.30	" "

"The increase in the amounts of free and albuminoid ammonia are very striking. So, also, in the astonishing decrease of oxygen, showing that this vital principle has been used up in the oxidation of decomposable matters in the water." By comparing this analysis with that of the water fresh from the driven wells, it will be seen that the amount of free ammonia has increased 7-fold; that of albuminoid ammonia, 2.3-fold; that of oxygen, required to oxidize organic matter (permanganate), 2.3-fold; that of chlorine, 2.5-fold; that of mineral matter, 1.26-fold; the amount of nitrites and of organic and volatile matter has not materially changed; the amount of nitrates is reduced 4-fold, and the total hardness is slightly diminished. In the report of Prof. Leeds, no attempt is made to account for these great changes in the same water when confined for a longer or shorter period of time in the cast-iron distributing pipes where no circulation occurs; and as this question should more appropriately be answered by a professional chemist than by an engineer, it will be passed over without further comment than that, in my opinion, it points to a considerable addition of organic matter, or water containing such matter, to the water from the driven wells. Whether this may be caused by the partial use of water from the outlet, cannot now be definitely stated, since no analyses of the outlet water separately have yet been made, or are available for comparison. It should, however, be remarked that because the water from a "dead end" in a system of distributing pipes is bad in quality, the inference that the whole supply is extensively or dangerously polluted is by no means justified without thorough examination.

SIGNIFICANCE OF CHEMICAL ANALYSES.

The prominent facts in the chemical investigations referred to above are substantially summarized as follows: 1st. At some time prior to 1884, Prof. A. A. Breneman, of Cornell University, analyzed the water from the *driven wells*, and pronounced it to be one

of the purest samples of water he had ever examined. 2nd. On December 31, 1884, Prof. J. Tingley collected samples from the mains and reservoirs for analysis, presumably whilst the supply was being taken from the *driven wells* alone, and reported that the water was not unwholesome, but better than the average water of cities. 3rd. On June 25, 1885, a sample of water from the mains, said to be a *mixture* of the driven-well water and the outlet water, was collected and sent to Prof. W. G. Tucker for examination, who reported that he considered the water of satisfactory purity for drinking purposes. 4th. On December 14, 1885, while the *driven wells alone* were in use as the source of supply, and had been for six months, a sample of the water from the mains was sent to Dr. W. H. Kent for analysis, whose report is that it compares well with waters which are considered good, and that as compared with ordinary well-water, it is far superior. 5th. On May 22, 1886, prof. Leeds collected a large number of samples for analysis during a period when the *driven wells alone* were used for supplying consumers; and a sample was also taken from the crib at the *foot of the lake*. Both waters were unhesitatingly pronounced to be good and wholesome. 6th. No analysis of the water from the *outlet* alone are at hand. 7th. No evidence is given that, when received by any of the chemists mentioned, the water was affected with any unpleasant taste or smell, except in the single instance where it was taken from "dead-ends" by Prof. Leeds. 8th. None of the samples were taken during the hot summer months, or in the fall, when the period of decay for the aquatic vegetation is most favorable. 9th. Only five such analyses have been made, of which but *one* refers to a mixture of the waters from the driven wells and the outlet in unknown proportions. 10th. Only *one* analysis of the water from the foot of Chautauqua lake is given, the sample being taken on May 22, 1886. 11th. The only clue to the *cause* of the disagreeable taste and odor of the city water at various periods during two or three years past is given by Prof. Leeds, who attributes such occurrences to the presence of small algæ in the water derived from the systems of driven wells.

In regard to the significance of the *chemical* analysis of a given sample of water, little can be said here, since it is now generally conceded by analysts of the greatest experience that a correct interpretation of the results thus obtained is encompassed with serious difficulties so far as the real sanitary value of the water is concerned. In an exhaustive report to the National Board of Health on the chemical methods in use for the determination of organic matter in potable water, made by *Prof. J. W. Mallet* in 1882, the author draws the following general conclusions:

"1. It is not possible to decide absolutely upon the wholesomeness or unwholesomeness of a drinking-water by the mere use of any of the processes examined for the estimation of *organic matter* or its constituents."

"2. I would even go further, and say that, in judging the sanitary character of a water, not only must such processes be used in connection with the investigation of other evidence of a more general sort, as to the source and history of the water, but should even be deemed of secondary importance in weighing the reasons for accepting or rejecting a water not manifestly unfit for drinking on other grounds."

"3. There are no sound grounds on which to establish such general standards of purity as have been proposed, looking to exact amounts of organic carbon or nitrogen, albuminoid ammonia, oxygen of permanganate consumed, etc., as permissible or not. Distinctions drawn by the application of such standards are arbitrary and may be misleading." * * *

These conclusions coincide almost exactly with what the late Prof. William Ripley Nichols frequently had occasion to assert. and tried for years to teach. In the chapter on water supplies in Buck's Hygiene (volume 1, page 303), Prof. Nichols stated that "In the majority of cases, chemical examination alone cannot be relied upon as giving conclusive evidence as to the suitability of a water for drinking. * * * If the water is grossly polluted, or is of exceptional purity, chemical examination can determine these facts; but in a vast majority of cases, while chemistry may teach something and aid in the decision, it cannot teach everything, and it cannot *decide*. * * * A certain amount of the same substance might in one case be a sign of fearful contamination, while in another it might indicate only a normal constituent of the water. In view of the impossibility of saying exactly what is and what is not harmful, any considerable departure from the normal character of the water in a given locality should be regarded with suspicion." Prof. Mallet, in the report already mentioned, also states that "It will not do merely to throw all doubts on the side of the rejection of a water, as has been more or less advocated by writers on water analysis, for there are often interests of too serious character involved in such rejection to admit of its being decided on, save upon really convincing evidence of its necessity." Similar views as to the uncertainty of chemical analyses are entertained by Dr. Charles Smart, U. S. A., as expressed in his paper on "The Present and Future of Sanitary Water Analysis," published in the report of the American Public Health Association for 1884, by Prof. A. R. Leeds, in a paper read in 1883 before the New York Academy of Sciences, wherein he remarks that "at the present time there is no method known of determining accurately the amounts and kinds of organic matter existing in the water we drink."

The amounts are so small, the kinds so various, the instability of much of the organic matter so great, that the best we can do is to make a tolerably accurate estimation of the total amount, and endeavor to find out what portion of this is safe and what is possibly

dangerous to health;" by Prof. E. R. Angell, in his paper "On the Sanitary Examination of Drinking Water," in the third annual report of the State Board of Health of New Hampshire; by Dr. Arthur J. Wolff, in a similar and very valuable paper in the eighth annual report of the Connecticut State Board of Health, recently issued; and by a large array of other well-known authorities upon the subject of water examination.

It should, however, not be inferred that the chemical analysis of a water is valueless because it cannot furnish data for absolute decision in all cases; but in order to acquire a proper value in a sanitary sense, the chemist should know as much as possible about the history and the source of the water from a personal examination of the locality, and should repeat his analysis with samples of the water taken at more or less frequent intervals during an entire year. In his treatise on "Water Supply, considered mainly from a Chemical and Sanitary Standpoint," Prof. W. R. Nicnols says: "There are many things which guide the chemist that he cannot put into numerical results or even on paper at all. Many observations are made in the course of an analysis by an experienced person, of which he is himself hardly conscious, but which aid in making up the final opinion. * * * At the present time, chemical examination, in connection with a thorough knowledge of a proposed source of supply, must be the main guide in the selection or rejection of a water. * * * It may be possible to state from the chemical examination of a single sample that no considerable or no appreciable contamination exists; but it is impossible to recommend a water for drinking without knowing something of the situation and surroundings of the source from which it is taken." In submitting the foregoing extracts, there is no intent on my part to disparage or underestimate the value of the several investigations heretofore made by distinguished chemists in relation to the Jamestown water supply, but the purpose is simply to point out that not enough work of this character appears to have been performed, since the real cause of the trouble has only recently been surmised, although not yet definitely proven. Another purpose is to show that a number of presumably careful analyses have already been made, and that only an elaborate series of thorough examinations of the water at various seasons of the year, and particularly during the periods when the bad taste and smell of the water appears, can serve to detect the true cause thereof, and assist in the discovery of the proper remedy.

OBSERVATIONS.

At the times of my inspection, I feel convinced that the water supply of the city was taken wholly from the driven wells. The water had no discernible odor, and only a faint, but not offensive, peaty taste, as taken from the city mains at a number of places. In the suction well the water had neither taste nor smell, and the

cleanly condition of the well itself has already been mentioned. From the statements of the attendant at the pumping station, about 1,000,000 gallons per day were then being delivered, but the yield of the driven wells was not sufficient to admit of an adequate or continuous supply to the consumers located at the greatest elevations in the system of distributing pipes. This feature is extremely objectionable on sanitary grounds, where the water-closets, and other appliances connected with the water-works in a dwelling, are not indirectly supplied from a properly trapped attic tank, but directly from the mains, as is here generally the case. The mouths of the suction pipes leading to the two pumping engines from the large suction well were not provided with suitable screens to exclude small fish, etc., from gaining entrance into the mains; this deficiency, however, may be easily and cheaply supplied. Concerning the small open reservoir previously described, little more need be said except that if retained for use in emergencies, it should be kept in a neater and cleaner condition, and be provided with a more substantial screening well than a fragile structure made of common, planed pine, matched boards. The sixteen-inch stop valve in the cast-iron pipe of the same diameter leading from the suction-well to the outlet was found closed, and there were evidences that it had not been opened for some time previously, although nothing stood in the way of its ready use. At the outlet this pipe terminates in a rectangular plank flume, or intake, about twelve feet long, divided transversely by an iron rack and wire screen into two nearly equal compartments, of which the one next to the stream is partially filled with common washed gravel retained by another iron rack at the outer face of the flume, while the other compartment receives the water which percolates through the gravel, or flows over the same and thence through the wire screen, from the outlet. As the principal complaint on the part of the citizens of Jamestown is about this pipe and its possibilities for furnishing water from the outlet into the city mains, a more complete description of the stream and its attendant conditions must be introduced here.

THE OUTLET.

The outlet of Chautauqua lake, from the foot of the lake as it now exists to the steamboat landing at Jamestown, is in dry seasons a sluggish stream, varying from ninety to 130 feet in width, and from six to sixteen feet in depth. As previously stated in the general description on pages 5 and 6, the length of its channel between the limits mentioned is about three miles, and its course is through, or bordering on, a large swamp for this entire distance. From data kindly supplied by Messrs. B. Nichols and O. E. Jones of Jamestown, and others who are thoroughly acquainted with the locality, the following facts are presented: In the summer season, the fall in the outlet from the lake to the steamboat landing is very small,

nd hence there is also only a slight current, which is largely ffected by the direction and velocity of the wind acting upon the urface of the lake, and also by the traffic of the numerous steamoats when in the stream. At ordinary stages of low water, the lischarge of the outlet, as computed by me from the data given, is bout 2,400 cubic feet per minute; but during the past summer the vater has been lower than at any time for twenty years previously, nd its discharge did not exceed 1,500 cubic feet per minute. The ottom of the channel is in general very muddy, as shown by the xcessive discoloration of the water by the action of the propeller vheels of the steamer. The passage of every such boat through he outlet stirs up large volumes of filthy looking, black mud and lecaying vegetable matter directly from the bottom, while the swash f the waves upon the soft, peaty shores and shallow margins, intenifies the results produced by the motion of the wheels. The naviable channel for the larger steamers is very narrow, in some places iot affording room for two boats to pass. There are eighteen reguar passenger steamboats plying between Jamestown and the various oints of interest on Chautauqua lake, seven of which make four rips each day during the season. The largest of these boats have draught of about seven and one-half feet, while the remainder lraw from four to six feet. The number of passengers carried by hese steamers to and from Jamestown is estimated at not less than 00,000 during the five warmer months, and as nearly as can be scertained, two-thirds of this traffic occurs in the months of July nd August, which would give for this shorter period an average ate of about 2,200 passengers per day. Most of these boats are rovided with closets opening directly into the water, and in addiion to the excrementitious substances, great quantities of other efuse organic matter necessarily find their way into the stream from he boats. A further pollution is caused by the drainage of the ounty fair grounds, which are located on the eastern side of the utlet a short distance above the steamboat landing; and beyond hese grounds, several ditches, which receive the drainage waters rom a portion of the city, discharge into the stream. Fortunately, his district is not yet provided with public sewers.

The water of the outlet at the steamboat landing has a slight, rownish tint, indicative of swamp discoloration, and contains nore or less matter in suspension. Its general appearance is epulsive, and unless first carefully purified and filtered, it should, n my opinion, not be used for drinking purposes. More or less gitation of the water is continually being produced at this point y the starting, backing and turning of the steamers, since it is the nly place on the outlet where the last named operation can be erformed with the larger boats. The intake of the water-works, owever, is located on a small indentation or basin, cut in the vestern bank of the stream, immediately opposite the steamboat anding; and hence, whenever one of the larger boats turns around,

it assumes necessarily, during this operation, a position relatively to the intake, such as to direct the offensive-looking currents caused by the wheels squarely towards the face of the same. If, at this period, any water were being taken from the outlet to supplement the supply from the tubular wells; and should the upper layer of the gravel "filter," in the outer compartment of the plank flume or intake, happen to be removed to a depth of about six inches, or more, below the water surface, as it was at the times of my inspection, then there would practically be nothing but the wire screen in front of the transverse partition in the flume to prevent the coarser impurities in the water thus agitated from gaining entrance into the suction well, and thence also directly into the distributing mains. As the meshes of this screen are about one-eighth of an inch square, no particular sanitary value can be ascribed to its operation.

Some stress is laid upon the fact that the company have provided a body of gravel, about five and one-half feet long, three and one-half feet wide and five feet deep, contained in the outer compartment of the intake, and that in percolating through this the water will be sufficiently filtered to admit of its use for domestic purposes. Let us briefly investigate this manifest fallacy, and even take it for granted that *all* of the water must percolate through the said mass of gravel before it can flow into the suction well. The required total supply may be assumed at 1,500,000 gallons per day, of which 1,000,000 gallons are furnished by the driven-wells, and the remainder, or 500,000 gallons by the outlet. Now, the latter quantity is at the rate of forty-six and one-half cubic feet per minute, and this would probably have to be doubled during the period of maximum consumption of the water, thus making the draught from the outlet at the rate of ninety-three cubic feet per minute during said period. The filter area presented by the face of the intake, or mass of gravel at the outlet, is about eighteen square feet, and hence the flow through this "filter" must occur at the rate of *over five cubic feet per square foot of filter area per minute.* To secure efficient filtration of much more agreeable looking water than that contained in the outlet, even when not made turbid by the action of the steamboats, it has, however, been found necessary by long experience elsewhere, to construct the filter of fine sand, and to pass the water through the same at the rate of about twelve cubic feet per square foot of filter area per day of twenty-four hours. The rate of percolation above computed for the outlet water through the mass of gravel in the water intake at Jamestown is, therefore, 620 *times greater* than the usual maxium rate of filtration through sand in order to render a cleaner water potable; and hence it is not surprising to learn that, in order to obtain sufficient water for suction in emergencies, the upper portion of the gravel in the aforesaid intake must be removed, since even with the limited quantity assumed above, the rate of the percolation through the gravel is found to be too slow.

Considerably more, with reference to the use of the outlet water in the past by the water works company, might be written; but as the recent completion of the conduit line to the foot of the lake has rendered the water supply, independent of the outlet it need only be said that the further use of the sixteen-inch cast iron pipe, between the suction well and the outlet, should be strictly prohibited, and that if the same be not entirely removed the stop-valve which controls this source of supply should be provided with a suitable locking device, the key whereof to be kept in the possession of the proper city authorities and to be used only in extreme emergencies.

THE NEW LAKE SUPPLY.

Partial references to the supply of water from the foot of Chautauqua lake have already been made in the foregoing, which will now be supplemented by a fuller description of the lake, its environments, and the plans carried out by the company.

Chautauqua lake is a handsome sheet of water, fifteen miles long and from one to two miles wide, occupying a broad and deep valley in the highland region, south-easterly from Lake Erie. Near the middle of its length the lake is very much contracted by three projecting hills, giving it the appearance of two lakes connected by a strait. It is said to be 726 feet above Lake Erie and 1,291 feet above tide-water. The hills surrounding it are from 400 to 800 feet above its surface, and the area of its water-shed, as deduced from a large county map, is about 170 square miles. The rocks which crop out at many places in this drainage basin are classed by geologists among the shales and sand-stones of the Portage and Chemung groups. On the uplands the surface soil is principally clay, mixed with disintegrated shale and some loam; and in the valleys it is of a somewhat better quality, loam and alluvium predominating over the clay. In consequence of its hilly character the land is in many places better adapted to grazing than to agriculture, although grain and fruit farms are very abundant. Considerable woodland also may be noticed on the water-shed. The lake receives a large proportion of its water supply from sub-aqueous springs, notwithstanding the fact that the map shows a great number of tributary streams. It is stated on good authority that nearly all of the latter become almost wholly dry in the summer, and that the volume of water discharged by the outlet is then much larger than the aggregate volume of the visible tributaries. Within the past ten years this lake has become famous as being the assembling place, during the summer months, of several religious denominations and educational institutions. Numerous beautiful sites on its shores are also occupied as summer resorts and temporary camping grounds, and others have grown into prosperous villages with a permanent population, which is greatly increased by visitors in the warm months. It is estimated by those who are familiar with the peculiar conditions, that the permanent population of the shores of

the lake is about 3,200, and that during the season beginning with June and ending with September this population is augmented to an average of at least 16,000; also, that the permanent population of the entire drainage basin is about 6,000. The greatest number of visitors to the various resorts on the lake are present during the months of July and August, so that for a period of a few weeks the average figures above mentioned must be nearly doubled.

From what I have been able to learn from inquiry alone concerning the sewage from these numerous resorts on the shores of the lake, I am led to the inference that at all of them, except Chautauqua, the practice prevails of throwing all organic wastes and sewage directly into the water, whenever that method of disposal is the most convenient or economical. At the few localities which I had time to visit, iron and stone-ware pipes leading from large and well-filled hotels out into the lake for a short distance, and large deposits of sewage sludge on the bottom and along the muddy, shallow shores, together with a profuse aquatic vegetation in the vicinity of such places, told their own story and justify the inference expressed above. Furthermore, there is no reason to believe that any precautions whatever are taken to prevent the pollution of the tributary natural water-courses at the numerous farm houses, hamlets, villages, dairies and mills on the entire water-shed. It is, therefore, reasonable to expect that large quantities of organic matter of animal origin find their way into the waters of the lake, both directly from the habitations on the shores, and indirectly from those remotely situated by means of the tributaries when in flood. To what extent, however, this pollution practically affects the potability of the lake waters, if taken from points at a considerable distance from such visible sources of contamination and at a depth of several feet below the surface, cannot now be said; but in view of the absence of any appreciable currents in so large a body of water below the surface; also of the enormous dilution, whereby the danger of infection of a particular locality in so great an area is correspondingly diminished, and finally, of the fact that the most of the organic matter carried in suspension in the polluted tributary waters settles down upon the bottom very soon after leaving the shores, it becomes fair to assert that if the water taken from this lake at a judiciously selected point should be used for drinking purposes, the possibility of injury to the public health would be very remote. Since it is known that much of the supply is contributed by subaqueous springs, the site in this large lake of such a spring, located in a depth of water sufficiently great to remain unaffected by roiliness due to the action of the waves upon the shore, and by the growth of aquatic vegetation on the bottom, also at a long distance from any unavoidable pollution on the margins or uplands, would doubtless be regarded as an ideal source of supply for domestic consumption; but just where all these conditions are realized in Chautauqua lake, and where it would still be practicable for the James-

town Water Supply Company to construct an intake, I am as yet unable to say, on account of the absence of the data necessary for such a judgment.

In order to convey a clearer notion of the lake and its surroundings, the accompanying maps, plates II and III, are submitted and attention thereto is invited. The general axis of the lake runs south-easterly from its head at Mayville, and the prevalent winds follow this same direction. Wagon roads on each side afford means of access, independently of the water routes, to nearly all points of interest on its shores. The latter are, in general, gentle slopes for some distance back, although bold bluffs are freqently seen. The northern or eastern shore is generally hard and of a gravelly character, while on the southern or western shore, large tracts of shallow water with a muddy bottom, occur often, especially in the lower portion of the lake in the vicinity of Lakewood, as shown by the soundings recorded on plate III. The difference between the ordinary high and low water levels is about three feet, but an extreme range of abont five feet appears to have been noticed. During the past dry season the surface of the lake has stood at least six inches below its ordinary summer level, thus exposing wider beaches than usual and making the shoals more dangerous to navigation. By referring to the map, it will be seen that the entire lower portion of the lake is comparatively quite shallow, a depth of twenty feet being first reached at a point nearly six miles above its foot, and a depth of only ten feet at about one-half of this distance. So far as could be learned from fishermen and others, the bottom in this shallower portion is largely a soft mud, composed of fine sand, muck and vegetable matter, upon which aquatic plants seem to grow in great abundance.

From the extreme foot of the lake the Jamestown Water Supply Company have recently completed arrangements and devices to take a part or the whole of the amount of water required for use in the city, as heretofore mentioned. The intake is a timber crib, thirty feet square on the bottom, twenty feet square on the top, and ten feet high, with its northern and western sides sloped on an angle of about forty-five degrees, while the two remaining sides are vertical. Its relative position is approximately indicated upon the accompanying maps, being about 200 feet distant from the nearest shore, and about 500 feet from the channel usually followed by the steamers. The crib is reported as having a thick plank bottom supported on a series of timbers and piles driven into the sandy mud bottom of the lake. At the times of my inspection, the water along the shore in this vicinity was barely six inches deep, and for some distance around the crib the greatest depth found by soundings did not exceed four and one-half feet, the bottom in all cases being soft, muddy and filled with vegetable matter in all stages of growth and decay. The structure is said to have been

built early in 1885, and exhibits around its sides a water mark which is from twelve to fifteen inches above the surface of the water at the time of the observation, when the lake was unusually low. There is no evidence of any direct sewage contamination of the water or shores in the immediate neighborhood of the crib, as the land is here rather sparsely settled; there is, however, an abundance of aquatic vegetation, consisting of a variety of the coarser algæ, reeds, rushes, etc., growing up from the bottom. On the nearest or southern shore, the nearest human habitation is a farm house on some high ground more than a quarter of a mile distant; and the small settlement, named Fluvanna, on the northern bank, opposite the crib is likewise located at some distance from the water's edge. It is not probable that any pollution from this hamlet would become noticeable at the crib, since the slight current towards the outlet would tend to deflect the same in the direction of Jamestown. A number of sandy bars and shoals in the lake, between the crib and the nearest populous summer resort, called Lakewood, are plainly defined by a dense growth of reeds, etc., and serve to some extent in protecting the water around the intake from the sewage impurities discharged immediately into the lake a mile and one-half or two miles above. When visited, the water in this locality was very warm, and slightly turbid with numerous minute particles, apparently of vegetable origin, held in suspension. During storms the water is also said to become very roily in consequence of its small depth and the action of the waves upon the soft bottom.

Several of the disadvantages of this location of the intake for a domestic water supply appear to have been recognized by the company while constructing the crib, since an attempt was made to filter the water through a stratum of gravel deposited in the hollow sides of the structure before admitting it into the conduit pipe and suction well. The adjacent diagrams show a plan and and a cross section of the crib as built, with its surrounding hollow sides filled with gravel on the bottom and loose stones on the top. Under ordinary circumstances the water is supposed to gain access to the interior chamber, which is fifteen feet square and of the full depth of the structure, by flowing through a series of open joints left in the outer timber work, then percolating through the gravel ballast having a thickness of about five feet, and finally escaping through another series of open joints in the inner timber work, after which it passes through a wire strainer with fine meshes, placed directly in front of the mouth of the twenty-four-inch conduit pipe, C B, and commences its journey to the suction well at the pumping station, 10,200 feet distant. Some doubt as to the capacity of this filtering arrangement, however, seemed to be entertained, and hence for use in emergencies requiring a larger volume of water, an opening, D E, two feet square, and extending completely through the rear wall of the crib, was provided. The outer end, D, of this

large passage-way for unfiltered lake water is left open and unprotected, but its inner end, E, is furnished with a sliding gate and wire-cloth screens to exclude fish, etc., from the interior chamber. It should also be remarked that this opening or inlet, D E, as well as the conduit, C B, is located immediately above the bottom of the crib, and that the said conduit is laid on the lake bottom, and thence in a trench excavated therein to a stop-gate on the shore, and 400 feet distant. The general character of this twenty-four-inch sheet-iron conduit pipe, and the difficulties encountered in its operation, have already been described, and for the present we need only add that this pipe is laid through the swamp in a straight line and on a regular grade, with a total fall of seven feet from the low-water surface in the lake to the bottom of the said pipe in the suction well.

Let us now turn our attention to the capacity of this conduit, and to the efficiency of the filtering arrangements provided in the crib. If we assume that the surface of the lake is at low-water mark, and that by the operation of the pumping engines the water in the suction well is maintained at the level of the top of the twenty-four-inch sheet-iron pipe, the latter being considered as the only source of supply, we shall then have the condition that the fall in a twenty-four-inch pipe, 10,200 feet long, is five feet; required its discharge in twenty-four hours. It will be found, by proper computation, that the discharge sought will be substantially 3,000,000 gallons per day, and hence that the sheet-iron conduit is capable of delivering to the large Holly pumping engine a sufficient amount of water from the lake to enable it to be operated to its full rated capacity. Now if the whole of this quantity of water can percolate through the gravel lining contained within the hollow timber walls of the crib, the surface thus presented as a filter may be considered as the area of four vertical sides, each about twenty-five feet long and five feet high, or equivalent, on a liberal estimate, to 500 square feet; and the rate at which the water will then percolate through the gravel will, accordingly, be 6,000 gallons per square foot of filter surface per day. It has, however, been found, by long experience, that gravel alone is not an efficient means of purifying water for drinking purposes, and that it is necessary to pass the water through a considerable thickness of fine sand at a rate not exceeding about ninety gallons per square foot of filter surface per day in order to render the water free from any reasonable suspicion. We, therefore, find that the rate of percolation through the gravel in the sides of the crib is far too great to materially improve the quality of the lake water, and that for all practical purposes said gravel can only serve to exclude some of the larger objects contained therein.

With respect to the advisability of properly filtering the lake water taken at the crib before delivering it to the consumers, much might be said in favor of such a project. There can be no doubt

that this water would thereby be rendered vastly better and safer in all regards, notwithstanding the excellent character which it possessed on May 22, 1886, according to the report of Prof. Leeds, above quoted. It is a well-recognized fact that the amount of organic matter contained in all surface waters varies considerably with the season of the year, so that the examination of a single sample is of comparatively little value. During the periods of spring freshets and autumnal rainfalls, large amounts of organic and mineral matter on the surface of the drainage area are washed into the lake, while in seasons of drouth, on the other hand, contamination from this source practically ceases. The quantity and condition of the various forms of animal and vegetable life, from which no surface waters are ever entirely free, also modify to a very appreciable extent the character of the water. Thus the presence of fish in a source of supply is generally regarded as an advantage rather than otherwise; and as far as known, any trouble arising from them is quite temporary and accidental. In like manner the minute crustaceans, entomostraca and other similar animalcules, which are found in many surface waters at certain seasons of the year, doubtless tend to purify the water by removing or absorbing objectionable substances; and after having attained their growth, they become, in turn, the food of larger animals. The flowering aquatic plants, too, are considered to be a benefit to the water while growing, since they absorb nitrogenous matter and give off oxygen during this period; and the same is also true to some extent of the algæ and more minute vegetable organisms. So long as the plants are vigorous and healthy and not excessively abundant, they seem to produce no perceptibly bad effect on the water, and the amount of ammonia will usually be small; but as soon as they die and begin to decay, the amount of ammonia contained in the water suddenly rises and the quality of the supply becomes affected. The organic matter thus follows the cycle of nature; it is not destroyed, but simply undergoes a change in form and shape. At one period, it is a part of a living organism; at another it serves as food for a different form of life, and so on indefinitely. In all these changes, however, temperature is an important factor. Impure waters which are not complained of in the summer, whilst exposed freely to light and air, sometimes become scarcely fit for use in winter when the surface is covered with ice and deep layers of snow; and conversely, waters which are offensive during the warm months usually regain their potability at the approach of cold weather. The latter cases are, by far, the most numerous; and hence it may be said, in general, that no source of surface supply should be adopted on the strength of examinations made in the winter season alone, and that such examinations should be continued during the heat of the summer.

From the foregoing considerations, and the fact that only *one* analysis, made on May 22, 1886, of the water from the shallow foot

of Chatauqua lake is available, no positive assurance as to the permanent excellence of the water from this part of the lake can be given unless some efficient process of filtration is adopted during the summer and autumn months at least. During the winter, when the processes of animal and vegetable growth are in a great measure suspended, and when a covering of ice on the lake prevents the water from becoming roily by reason of the absence of wave action; also during the spring, when the aquatic plants and animals absorb the maximum amount of organic matter, it may be possible that the water taken from the above described locality can be safely used for domestic purposes without recourse to filters; but upon this point no valid scientific opinion can at present be given, and hence a conjecture based on probabilities and experience elsewhere is alone permissible.

THE CONDUIT.

Before leaving this subject, some attention should also be given to the character of twenty-four-inch sheet-iron conduit which serves to convey the water from the foot of the lake to the suction well of the pumping engines, about two miles distant. The general features of this pipe and its location have already been mentioned, and it should now be added that much fear has arisen with regard to the possibility of the infiltration of the swamp waters through defective joints or seams. Although at the time of my inspections this conduit was not in operation, yet I have no hesitation in expressing the opinion that, when running full, many small leaks will be discovered sooner or later both in the joints and seams of the thin metalic sections, and in the portion recently replaced with a wooden construction. The adjacent diagram shows the form, dimensions and mode of jointing this latter tube. The material used is planed and matched white pine planking, two inches in thickness and well nailed at intervals of about eight feet to vertical posts at the sides and to horizontal sills on the bottom. This section is about 2,000 feet long, and is connected at the ends with the spiral-rivited sheet-iron pipe previously laid and presumed by the officers of the company to be in good order. The soil in which the entire conduit is buried for nearly its whole length of 10,200 feet, is a quaking mass of black swamp muck or peat, whose surface is from two or three feet above the low-water level of the lake and outlet; and hence the water contained in this material is doubtless highly charged with vegetable matter in solution. Such material is, however, not very permeable, and the rate of filtration through the same is consequently very slow. It is, therefore, evident that with a reasonably tight conduit, only a very small proportion of the water delivered at the pumping-station will be infiltration from the swampy subsoil, and that the dilution of the latter will be exceedingly large.

Respecting the sanitary significance of waters which have percolated through masses of peat or muck, many conflicting opinions

prevail. On the one hand it is asserted that this substance is a powerful disinfectant, and that, therefore, the water which filters through it cannot be dangerous to health; while on the other hand reputable authorities insist that such water is capable of producing disease. This question has been thoroughly discussed in the report of Prof. J. W. Mallet, already cited, and in which the conclusions reached are as follows: "It is not safe to affirm, on this evidence (experiments with rabbits and water containing much vegetable matter) alone, that similar waters, if diluted to the ordinary potable standard, would still prove themselves capable of causing disease or death in the animals experimented upon. Water containing much vegetable organic matter is often used for drinking purposes in peaty districts, and is often taken by choice as the supply for ships leaving port, and has been spoken of as a source of supply for the city of Norfolk. If the theory be accepted, which has so much in its favor, attributing the production of disease by organic matter in drinking water not to any specifically poisonous *substance or substances*, but to the presence and action of living organisms, it seems quite conceivable that a water containing organic matter of any kind may be harmless at one time and harmful at another, when perhaps a different stage of fermentation or putrefactive change may have been entered upon, and special organisms may have made their appearance or entered upon a new phase of existence. Thus there might possibly be safety in drinking a peaty water, or water filtered through beds of dead forest leaves, when fresh; danger when, after a certain amount of atmospheric exposure, bacterial organisms had become developed; and safety again, perhaps, after the growth of such organisms had fallen off and more or less of the available organic matter had been consumed." In like manner, Prof. W. R. Nichols, in his work on water supply (page 84), remarks that "when the vegetable matter is thoroughly humified, as in the case of peat, it exerts, apparently, no bad affect on the water, except by giving it a brown color and a somewhat earthy taste." Quotations from numerous other trustworthy authorities to the same effect might be adduced, but it is believed that the foregoing will suffice to allay any serious fear of a dangerous contamination of the supply by reason of the infiltration of swamp water through defects in the conduit.

A leaky condition of this pipe is, however, not to be recommended or encouraged, and it behooves both the company and the city authorities to give ample evidence at frequent intervals of time that the leakage is not appreciable. This can be accomplished readily by excavating the peaty material which covers the conduit, whereupon a careful examination of the degree of saturation of the sub-soil at a sufficient number of places will serve to demonstrate how secure the joints and seams actually are. A much better and more commendable plan would be the entire removal of the questionable pipe or conduit, and replacing it with one whose strength

and method of construction will afford some reasonable guarantee of its remaining substantially water-tight. Of the existing contrivances of sheet-iron and wood, little more can be said than that if they are found to be and to remain practicallytight, the success of the experiment must be attributed to a fortun ate accident rather than to a wise or prudent design.

THE TUBULAR WELLS.

It now remains to consider, at somewhat greater length than was done above, the quality of the water furnished by the system of tubular or driven wells. The circumstance that a supply derived from a stratum of clean gravel, about 100 feet below the surface, and underneath a body of impervious clay ranging from sixty to eighty feet in thickness, should become affected with a disagreeable taste and smell at irregular intervals of time during a period of several years, is remarkable and deserves a most thorough investigation. The characteristics of the water alleged by the company to have come exclusively from this source during these periods of offensiveness have already been detailed, and it has also been stated that the cause of the trouble was ascribed by Prof. Leeds, on the one hand, to the presence and decay of certain minute algæ, whose spores are contained in the deep well-water, and by many residents of Jamestown, on the other hand, to the admixture of filthy water from the outlet to the deficient supply obtained from the driven wells. A reference to the reports of the several chemists who have examined the water at different times will show that, when the samples for analysis were taken, the water from the driven wells was free from any offensive taste or odor, and was otherwise of good quality. The same is true also of its quality during my inspections. It is greatly to be regretted that no examination was made at a time when the water in both the mains and the wells was bad, and that the true cause of the difficulty must be left to conjecture. I am not fully convinced that spores of algæ contained in the *well-water* are the real cause, since a hurried microscopic examination of muddy water, collected by me personally at the bank of the outlet, quickly revealed therein the presence of several species of minute algæ belonging to the Nostoc family, the most abundant being *Clathrocystis*, which species is known to have rendered water supplies elsewhere extremely offensive when present in considerable quantity. Another circumstance is the absence of any developed algæ in the tubular wells themselves, wherever temporarily disconnected from the long suction main and carefully examined both by Prof. Leeds and myself. Now, the fact is, that whenever the water in a deep driven well becomes affected with these or similar vegetable growths, ample evidence thereof is generally afforded by their presence in the tubes in relatively large masses, particularly near the standing water level. None of the several tubes actually

examined, however, exhibited any such growths near the top, nor did the plummet and cord used in sounding the depth of the wells betray in any manner the existence of such algæ in noticeable quantity. In view of the positive assurances of the officers of the company that no water from the outlet was used to supplement the supply from the driven wells since June, 1885, except on two occasions of short duration each, and of the foregoing statements of fact, the cause of the offensive taste and smell of the water furnished to the consumers must be referred to one of the following two circumstances: 1st. Either the gate controlling the supply from the outlet was not wholly closed, or else, on the two occasions this year when it was confessedly open, a sufficient number of these algæ known to be in the outlet waters gained entrance into the system of distributing pipes, and by their decay gave rise to the disagreeable taste and odor; or 2d. Some unknown species of algæ has appeared in the deep well water, and by developing and dying in the system of distributing mains is the occasion of the trouble. Which of these alternatives is the correct one does not now admit of absolute demonstration with the evidence at hand.

It is a fact that the spores of certain minute plants may exist in the deep seated water reached by means of driven wells, and that upon the contact of these spores with atmospheric oxygen, and the presence of certain mineral salts in solution in the water, a rapid development of the plants may occur, as happened in the cases of the water supplies of Berlin, Halle, Lille and several other cities in Europe. The same phenomenon also appears to have been observed in different places, since Prof. W. R. Nichols, in his book on Water Supply, makes the following reference thereto: "It is frequently noticed that water, and especially water from a *driven-well*, although apparently clear when first drawn, becomes turbid on standing and deposits an ochreous sediment. This is generally due to the presence in solution of the proto-carbonate or to some organic proto-salt of iron, which, on exposure to the air, becomes oxidized and changed to an insoluble hydrated sesqui-oxide. * * * The microscope showed that the ochreous sediment which settled from samples of the water, and which accumulated in the reservoirs and in the pipes, especially in dead-ends, was by no means made up wholly of amorphous mineral matter, but consisted very largely of algæ, dead and alive." Under favorable circumstances, these plants grow very fast and seem to be independent of conditions of pressure or current. It has also been ascertained that they may continue to live in all seasons of the year, although the warmer months are more conducive to their development. One species, the *crenothrix polyspora*, exists in the deep sub-soil itself, having been found in one instance at a depth of about eighty feet below the surface. Prof. Carl Bischoff, an eminent chemist of Berlin, Prussia, in an exhaustive report on this subject made in December, 1880, gave it as his opinion that the impurity of the water supply

of Berlin was due to the crenothrix which flourished so abundantly in the deep wells (near the shore of Tegel lake) whence the water was pumped to the city, and also to the salts or combinations of iron which are formed and deposited partly by the vital processes of the plant itself, and partly by chemical action. He also remarks that it is not impossible for the iron distributing pipes to be responsible for a share of the blame, but only after the organisms have once gained entrance therein.

For this trouble with algæ in deep-seated waters there seems to be no remedy, and the only consolation that can be given is the assurance of the physicians, sanitarians and biologists who have carefully studied the subject both in this country and abroad, that no serious injury to the public health results from the use of water containing these plants. Elaborate investigations were conducted at Berlin from 1877 to 1880, and at Boston by the Massachusetts State Board of Health in 1879, with the same results. Those arrived at in Boston are found in the State Board of Health repor for the year mentioned, and are "of value to the public in relieving them of needless anxiety with regard to danger to health from these plants. The medical correspondence of thirty-three physicians tends to show that the plant acts mechanically chiefly, perhaps like unripe fruit, when affecting the health at all, in causing diarrhœa; but that the filtered water is harmless." It should also be remarked that the algæ which caused the troubles at Berlin and Boston belonged to different species. Similar conclusions were also reached by physicians and sanitary experts in Rochester, N. Y., Poughkeepsie, N. Y., and many other localities where like difficulties with the public water supplies have occurred within the past decade, and were closely investigated.

In consideration of these facts I do not see how, from a sanitary point of view, the water taken from the tubular wells at Jamestown can be declared as dangerous to the public health of that city. The source is the one which all authorities unite in pronouncing the most desirable for a public supply, and the least liable to serious contamination; and it has, moreover, not yet been satisfactorily established that algæ to any appreciable extent occur therein. Until this circumstance has been proven beyond a doubt, I can only coincide with Prof. Leeds in believing that the water from the driven wells "is unquestionably superior in quality to the lake water" and is "excellent, pure and in every respect palatable." Should such proof, however, be furnished, then filtration through sand will do much towards rendering the water more agreeable to the senses, and hence also more desirable as an article of merchandise; or else an improvement in its quality may possibly be effected by the simpler expedient of injecting compressed air into the pumping main, and thus artificially increasing the amount of oxygen in the water. This latter process has been in successful operation for nearly two years at the pumping station of the

Hoboken water-works, but whether its effect upon the particular algæ, which Prof. Leeds thinks are contained in the deep-well water at Jamestown, will be equally beneficial, can only be determined by actual experiment.

OTHER SOURCES OF SUPPLY.

We have thus seen that of the three sources of supply now available to the company, the first, from the outlet, must be condemned at once as being too greatly polluted; the second, from the foot of the lake, is abundant but, in my opinion, of inferior quality and generally suspicious unless filtered; while the third, from the driven wells, is excellent in quality but deficient in amount; and the question now arises whether other sources of wholesome water cannot be found within a reasonable distance of the company's works and be utilized in supplementing the yield of the series of driven wells. To this the following answers are submitted: First. A sufficient gravity supply appears to be too remote and hence too expensive to be practicable. The only available source of this kind is reported as being about sixteen miles distant and admitting of about 100 feet fall to the highest street in the city. Now assuming the necessary quantity at 3,000,000 gallons per day, which rate of consumption has already been reached at times in the city, then it will be found that a twenty-inch iron conduit must be laid for this distance, at a cost under the most favorable conditions of not less than $232,000; and if we add to this the probable cost of a suitable reservoir, the right of way and the privilege of taking the water, an estimate of $250,000 will not be excessive. A sum of this magnitude cannot be raised by the company under existing circumstances of revenue from the works, and this project must accordingly be dismissed, for the present, at all events. Second. An unlimited supply of wholesome water can undoubtedly be secured from the lake at some point where its depth is at least twenty feet, and which is at a long distance from any unavoidable source of pollution, as already pointed out above. Such a locality, however, cannot be found nearer than eight miles from the present pumping station, or six miles above the foot of the lake. To furnish the requisite volume of water from this source into the suction well of the pumping engines at Jamestown, would involve the construction of a sixteen-inch iron pumping main eight miles long, an additional pumping station, and a long, iron suction pipe out into the lake, at an estimated expense of not less than $104,000; and to remove the existing pumping station and engines to the said point on the shore of the lake, and from there force the water directly into the city mains, would require the laying of a twenty-inch iron force main, also eight miles long, the removal of the machinery and buildings, and their erection at the new site, all of which would entail a cost of at least $123,000. For the same

reasons as before, neither of these plans appear to be feasible to the company. Third. It has been suggested that an additional number of tubular wells be driven into the same stratum of water-bearing gravel which supplies the present wells, and thus to obtain the necessary amount of excellent water. To this proposition the officers of the company object, on the ground that the supply from this source already gives evidence of failure or inadequacy, and that they cannot afford to indulge in costly experiments. In reply to those objections it may be remarked that this scheme seems to be the only one which, under all the circumstances, can be recommended for the company to adopt, as it will prove to be much cheaper than any rational system of filtration of the questionable water from the foot of the lake. It is further alleged that troublesome algæ are contained in this deep-seated water, and that the evils complained of by the residents of Jamestown would not be remedied by increasing the supply derived from this source; but in opposition to these assertions, it must be remembered that the existence of such algæ in the water from the driven wells of the company has not yet been sufficiently demonstrated to warrant the acceptance of the statement, and the rejection of this project for relief. I would, therefore, urge that this water be more closely and more frequently examined than heretofore, by an expert microscopist, before a final decision is reached, and that in collecting the samples care be taken to secure *water directly from the wells*, instead of drawing it from the distributing mains in which the algæ are known to be present, since it is at least equally possible that they may have come therein with water from the outlet or the foot of the lake.

With respect to the probable cost of obtaining an ample supply of water by means of a new system of driven-wells in this locality, the following estimate may be made, it being assumed, of course, that there is no question as to either the sufficiency, the permanency, or the quality of the source. These vital elements can be ascertained only by absolute trial, and there is, accordingly, some risk connected with this plan, which should be carefully weighed. It has been stated that, in the aggregate, thirty-one three-inch tubular wells have been driven, of which it is known that seven are useless in dry seasons, as heretofore mentioned. It is further known that of the remainder, a few are more or less constantly disconnected from the long collecting or suction main for necessary cleaning out or repairs; and it is positively asserted by the officers of the company that the balance left of the wells furnishes all of the water pumped into the city mains. This quantity of water is, however, claimed to be about 1,000,000 gallons per day in an unusually dry season, and, according to the foregoing, it is derived from not more than twenty-two three inch wells; hence, the average yield of each well is about 45,000 gallons per day. Now, from experience with tubular wells, it is found that, when

the source is ample, the yield will increase *at least* in direct proportion as the diameter of the tube is increased; and that, therefore, a well eight inches in diameter will, in the same place, give at least two and two-thirds times more water than a three-inch well. Accordingly, if the yield of the latter is 45,000 gallons per day, that of an eight inch well will be at least about 125,000 gallons in the same period of time; and hence, to obtain a daily supply of 3,000,000 gallons, twenty-four such wells must be provided. Assuming further that these wells should be driven in two rows 150 feet apart, and the same distance from each other, all being connected to a central collecting or suction pipe terminating at the pumping engine, there would be required the following lengths of such pipe, which may diminish in size towards the farthermost pair of wells: 1,200 feet of twenty-inch pipe, 600 feet of sixteen-inch pipe, 300 feet of twelve-inch pipe, and 1,800 feet of eight-inch lateral pipe. As none of these pipes will be subjected to any material pressure, they may all be of the lighter grades of cast iron pipe, and their cost, laid in place and ready for use, will be about $6,600. It is also learned from parties who make well sinking a specialty, that a liberal estimate of the cost of driving an eight-inch tubular well, complete in all particulars, to a depth of 120 feet below the surface and through the several strata named both by the officers of the company and by Prof. Leeds, will not exceed $360, so that twenty-four such wells would cost about $8,600. The total cost of a proper system of such wells would, therefore, be about $15,200, estimated on a liberal basis and on the above assumptions respecting sufficiency and quality of source. It should be remembered, also, that this estimate is for a capacity of nearly twice the quantity of water which ought reasonably to be consumed daily in the city with its present population, nor does it make any allowance for the value of the large and long suction main already laid and in use.

The foregoing argument in favor of a new and larger system of driven wells is open to the criticism that it takes the elements essential to success for granted. To this it may be answered that the existence of at least three *flowing* wells and the evidence of the company's officers regarding the remainder, prove that a large supply of water is available in the deep subsoil near the pumping station; and concerning the quality of this water, reference need only be made to the reports of Prof. Leeds and the other chemists, as published in the company's recent pamphlet, from which the quotations above made were taken. The statements as to the gradually diminishing yield of the small wells now in use, may likewise be met with the assertion that such diminution is due to either a silting up of the foot of one or more tubes, or to a lack of proper operation. A positive proof of this important statement, however, has not yet been furnished, and without it the plan of relief just suggested should not lightly be cast aside.

FILTRATION.

In case that it be conclusively established that any further development of the driven-well system is not expedient, also that circumstances render the securing of an adequate supply of water from any other locality than the foot of the lake impracticable from a pecuniary standpoint, then it will be extremely probable that a necessity for efficiently filtering the water from this source before delivering it to the consumers will soon arise. The shallowness of the lake for a long distance around the inland crib, its muddy bottom, the abundance of aquatic vegetation, the roiliness of the water during storms, and the conditions particularly favorable for the growth of the different varieties of troublesome algæ, together with a general sentiment on the part of the citizens of Jamestown that this water is quite impure in spite of the chemical analysis, all point to an early fulfillment of the above prediction. It will therefore be of interest to allude briefly to the subject of water filtration and its cost.

It seems scarcely necessary to say that if a public water supply requires filtering before being used for drinking or culinary purposes, such filtration should be performed at the reservoir or pumping station, instead of being left to individual effort, since experience shows that where the latter is required it will practically be left undone. The fact is that domestic filtration, to be efficient, involves so much care and attention that when undertaken, its results usually satisfy neither the sanitarian nor the financier, as compared with those obtained at a central station under experienced official supervision, whereby accidents and neglect in households are avoided and greater confidence in the use of the water is felt by all consumers.

The filtration of water on a large scale has been practised for many years in England and on the European continent, but comparatively little in this direction has been carried out systematically in our own country. Foreign experience tends to prove that the most economical and generally efficient method of procedure, is to filter large quantities of water through properly prepared beds of clean and fine sand, resting upon strata of coarser materials, and inclosed in water-tight walls of either puddled clay or cemented masonry. The bottom of these beds are also made imprevious in like manner, and have areas varying from 10,000 square feet upwards to 50,000 square feet. The depth of the filter materials is usually from four to six feet, the stratum of fine sand being from one to four feet thick. On the beds thus prepared the impure water is maintained at a depth of from four to eight feet, and is filtered in its passage downwards through the sand, gravel and broken stone, into the arterial drains resting upon the impervious bottom, from which it is taken into the storage reservoir or suction well. The "head" of water under which such a sand filter-basin is worked varies considerably, being dependent upon the depth and condition of the layer of sand, and the length of time that it has been used. The limits of this

head are from about six inches to several feet, but in no case should the clear water level be allowed to fall below the surface level of the sand. After the filtering process has been continued for a period of time depending on the amount of suspended matter in the impure water, the bed becomes clogged with the intercepted sediment, and it must then be temporarily thrown out of use, drained and cleaned by removing a layer of the sand, from one-half to three-fourths of an inch thick, together with the stratum of deposited matter. This practice is continued until the thickness of the sand layer has been reduced to about one foot, whereupon the filter is restored to its original depth by the addition of fresh sand. When the unfiltered water is free from marked turbidity, the cleaning of the beds may not be necessary more frequently than once a month, or in some cases once in two months; but when the water contains much silt or organic matter in suspension, the cleansing process must be performed oftener, although rarely at intervals of less than ten days. Filter beds have also been constructed so as to admit of cleaning by a reversal of the current from below upwards, with the expectation of thereby washing out the intercepted matter from the sand and allowing it to escape through suitable overflows in the sides of the basin. The fault of this system, however, appears to be that under the necessary pressure, the water blows through the sand irregularly, and leaves it in bad condition for downward filtration subsequently.

The rate of filtration through sand also varies considerably, but it rarely exceeds twelve cubic feet, or about ninety gallons of water per square foot of filtered surface in twenty-four hours. In the case of the water from the foot of Chautauqua lake, however, let us assume that a rate of 100 gallons per square foot per day can be safely attained. The area resulting from this rate with a delivery of 3,000,000 gallons per day, as before, would accordingly be 30,000 square feet, which might be divided conveniently into three beds of 10,000 square feet each. As this quantity of water is at present used only occasionally at Jamestown, it may further be assumed that an additional bed to be kept in reserve will here be unnecessary, and that the requirements will be amply met, for some years to come at all events, by the construction and alternating operation of three beds, presenting an aggregate area of 30,000 square feet. For a set of properly constructed filtering basins of this area, the sum of $36,000 will doubtless be regarded by engineers of experience as a very low estimate; and as probably the best location for the basins will be in the vicinity of the existing pumping station, an additional expense must be incurred in pumping the water from its level of delivery at the end of the sheet-iron conduit upon the filter beds. The lift here involved will be at least eighteen feet, so that extra engine and boiler capacity, amounting to about twenty horse-power, will have to be provided and constantly maintained; and the capitalization of the cost of continuously operating and

maintaining this power will not be less than $20,000. The total capital thus neccessary to be invested in a scheme for the filtration of the water from the foot of the lake, exclusive of the cost of properly working the filters, will accordingly be at least $56,000; and when it is found that the operating expenses of the filters alone will average about two dollars and fifty cents per million gallons of water filtered, or about seven dollars and fifty cents per day, the company will certainly find it to their advantage to incur the risk connected with the development of the tubular well system of supply. To show that the estimates above submitted, and referring to sand filters, are very low, I may remark here that in 1879, Messrs Croes and Howell reported to the Newark Aqueduct Board carefully made estimates of the first cost of filter-beds at about $30,000 per million gallons filtered daily, and a cost of maintenance of said beds at about three dollars per million gallons; further, that in March, 1886, Capt. Thomas W. Symons, United States engineers, adopted the same estimate in an elaborate report on the filtration of the water supply of Washington, D. C.; and finally, that in a communication from the secretary of the Newark Filtering Company, which controls the Hyatt patents for purifying water, published in the Sanitary Era of September 18, 1886, the expenses of filtration by that process are stated to be $15,000 per million gallons filtered daily for the first cost of the necessary appliances, and from two dollars and one-half to three dollars per million gallons, including interest on investment, for maintenance. Of the merits of the Hyatt system of filtration for potable water I have as yet no personal knowledge, but it has received careful study from Capt. Symons, and is strongly recommended by him for adoption in the case of the Washington water-works.

SUMMARY.

Having now given such a description of the Jamestown water-works, and the various circumstances connected with the complaints about the quality of the water furnished, as will enable a fair judgment concerning the numerous questions involved therein to be formed, it remains for me to briefly review the case as it presents itself to my mind. The city of Jamestown contracts with a private company for an abundant supply of pure and wholesome water; the citizens expect to receive water obtained from a system of tubular wells driven to a depth of about 120 feet below the surface of the ground where the pumping engines are located. To provide for emergencies, however, arrangements are made, with the consent of the city or village authorities, to make a direct communication between the suction well and the badly polluted outlet of Chautauqua lake. This connecting pipe, which can be readily controlled by means of a suitable valve, is then duly laid. After a time some of the driven wells do not give as much water as formerly, while the demand for water in the city constantly increases.

The yield of these wells is then supplemented more or less extensively and constantly by foul water from the outlet. This mixewater contains minute algæ, which are capable of communicating to it an offensive taste, smell and appearance, and which are distributed throughout the entire system of pipes. Complaints abouts the bad quality of the water furnished are made; relief is sought by driving more wells, but the supply thus derived is still inadequate; the water continues to be bad, and the outlet is occasionally used; an attempt is made to secure an ample supply frcm the foot of the lake but the conduit used for the purpose fails; more wells are driven, with the same result as before, the water continuing to be bad and the outlet to be used, at longer intervals, however During this period an elaborate investigation is made by Prof Leeds, in behalf of the company. He cannot account for the bad taste and smell of the city water, except on the hypothesis that the deep-seated water from the driven wells contains the algæ, which are the cause of all the trouble. All chemical analyses of the drivenwell water made by Prof. Leeds, and previously by other distinguished chemists, show that this water is of excellent quality; the people attribute the trouble solely to the admixture, at times, of impure water from the outlet. There is no physical reason apparent why the outlet should not contain such algæ, as all conditions favorable to their growth are present. A microscopical examination of muddy water, collected by me from the shore of the outlet immediately adjacent to the water-works intake, reveals the presence of certain algæ, which have elsewhere been recognized as the cause of an offensive taste and odor in the water supply. At the time of my inspection the valve in the outlet pipe was closed and the water in the mains was good, the supply being then taken wholly from the driven wells, but not being sufficient to serve all consumers. The company attribute the algæ to the water from the driven-wells; abandon the notion of obtaining an additional supply from the same source, and rebuild the conduit to the foot of the lake, with the design of taking a large portion of the required amount of water therefrom; the foot of the lake is, however, not particularly inviting as a source of supply, and protests against the action of the company are still heard; the officers of the company insist that their financial condition prevents the execution of such expensive works as will afford a guarantee of reasonable purity of the water furnished, and the city authorities hesitate about buying the waterworks, and also improving them; various schemes for obtaining a suitable supply are agitated, with costs as above set forth; but in the meantime the conduit to the lake is completed, and the company now asks that this source of supply be given a fair trial before any steps are taken by the State Board of Health or the Governor to bring about a change.

RECOMMENDATIONS.

If it should be deemed, by your board, expedient to comply with the request of the company to give their new lake supply a fair trial before ordering other radical measures to be taken, I would recommend that during this interval the water from the driven wells be regularly and systematically examined, with the view of ascertaining definitely whether it contains the algæ, or their spores, which have in the past imparted the bad taste and odor to the city supply.

Of the water in the foot of the lake I am somewhat suspicious, but I also hesitate about declaring positively that an elaborate system of filtration is absolutely indispensable, since at the intake the water is free from direct sewage contamination, and, owing to its shallowness, is not disturbed by passing vessels. There can, however, be no doubt that this water would be rendered safer by being properly filtered, and would then commend itself much more favorably to all consumers. In its original condition the chief danger to its use lies in the fact, that during the season when it contains much organic matter in solution, it may furnish the conditions necessary to the development of certain well recognized pathogenic germs. Strictly speaking, therefore, it might be affirmed that for some unknown period of time, the unfiltered lake-water drawn from the crib could be used for drinking purposes without materially affecting the public health; yet that, on the other hand, the same water, when infected with disease germs, would soon cause a serious epidemic. A certain risk always attends the use of such unfiltered surface water. How large or serious this risk is, cannot be definitely stated in the light of present knowledge; but we do know that whatever may be its magnitude, it can be vastly diminished by proper filtration. For the rest I submit the following:

1. Under all the circumstances which complicate a rational solution of the problem before us, I would advise the company to obtain the entire water supply for Jamestown from a larger and more approved system of tubular wells than the small one heretofore in use. It is the cheapest plan, as shown above; and even if it be conclusively proven that the offensive algæ are due wholly to this source, the assurance can be given that these plants are practically harmless, and that the water cannot be subjected to more serious contamination. As to the particular manner in which the requisite quantity of such deep-seated water shall be obtained, little further need be said, except that it is a matter of indifference whether the supply be obtained through a larger number of six-inch driven tubes, or a smaller number of greater diameter. The details of this work must be left largely to the judgment of men who make this business a specialty.

2. Now that the conduit to the lake is in operation, I would strongly advise that the sixteen-inch cast-iron pipe leading from the suction well to the outlet be either entirely removed, or at all

events that the valve therein which controls the admission of water from the outlet, be closed and securely locked and sealed in such manner as to render any tampering therewith obvious. Devices for this purpose are common, and need not be specified here.

3. A large number of dwellings on high land in the city have, during the past summer, while water was being used only from the driven-wells, received their water supply intermittently. Should the supply again fail, for any reason except an unavoidable accident, I would urge that all such houses be provided with proper tanks in the attics, into which the water supply shall be delivered directly from the mains, and from which it shall be distributed to the several fixtures or sanitary appliances. By this arrangement, offensive gases from the waste pipes will not be drawn into the water pipes when the latter are temporarily empty, as is always the case when the service is intermittent.

4. If the lake supply is retained in its present form, the water should at least be decently screened before entering the suction pipes of the pumping engines. To accomplish this most conveniently, a tight partition, enclosing the suction pipes, and provided with suitable openings protected by wire screens having meshes not larger than one-eighth of an inch square, should be built in the suction well. Provision should also be made in this partition to admit of the ready insertion of a new screen before the one in use is removed. The purpose of these screens is to exclude small fish, or other animals, which may have found their way into the suction well, from gaining admission into the city mains.

5. If for any reason the open reservoir adjacent to the engine house be retained by the company as an adjunct to their works, the same should either be permanently isolated from the suction well or the suction pipes, or else it should be provided with a more substantial screening chamber than a frail structure of matched boards. I would recommend, in such event, a durable chamber of stone or brick masonry with inlet openings of ample size, well protected with fine wire screens, each of which can be removed for cleaning after the insertion of a similar screen behind or in front of it. Care should also be taken to remove promptly all weeds and growths of algæ and confervæ as soon as they appear.

In conclusion, it is perhaps fair to say that the extraordinary length of this report is due to a desire to explain, to both your board and the authorities of Jamestown, some of the difficulties which confront those who will have the execution of the governor's orders in the premises. The Jamestown water trouble has been the subject of considerable sensational correspondence, out of which litigation, as I am informed, has already grown. A clear notion of all the elements in the case is therefore indispensable. As an abstract proposition, the solution of the trouble with the water supply requires simply considerable energy, skill and capital on the part of the company; but when the case is complicated with

legal questions, such as whether the contract with the company can be canceled because algæ have made their appearance in the supply, etc., and also with a deficiency of means to carry out some rational plan for relief, it becomes advisable in the interest of all parties to make the discussion sufficiently exhaustive. The officials of the city will thereby be better able to cope with the difficulty, and the company, on the other hand, will have no valid pretext for refusing to grant the improvements demanded, provided that such are practicable.

Respectfully submitted,

EMIL KUICHLING,
Civil Engineer.

STATE BOARD OF HEALTH OF NEW YORK,
ROCHESTER, N. Y., *December* 14, 1886.

DR. LEWIS BALOH, Esq., *Secretary of the State Board of Health, Albany, N. Y.:*

DEAR SIR.—In accordance with your request to submit to you any additional facts which may have presented themselves in relation to the Jamestown, N. Y., water case, on the occasion of our recent examination of the works and sources of supply made on the seventh instant, I beg leave to offer the following remarks as supplementary to my report of September 30, 1886:

1st. A very important correction should be made on the diagram marked Plate No. 1 accompanying my said report, in consequence of the failure of the water supply company to make serviceable the whole length of the twenty-four-inch conduit from the crib at the foot of Chautauqua lake to the large circular suction well in front of the pumping-engine-house. As stated in my report, the new work on this conduit was in progress at the time of my last visit to Jamestown in September, and from information afterwards obtained directly from the Messrs. Kent, I was led to infer that the same had been completed, as shown upon said diagram. Between September fifteenth and thirtieth a diagram, from which Plate No. 1 was subsequently constructed, was *twice* submitted, along with a series of questions, to the said officers of the company for examination and correction before my report was finished; but in their replies there was not the slightest intimation that said diagram was inaccurate in any particular, and hence I concluded that I had portrayed the whole of the several systems of pipes converging at the pumping-station correctly. Copies of this correspondence between the Messrs. Kent and the undersigned are in my possession, and I am confident that a review of these documents will convince you that the charge of inaccurate statements in my report, as preferred by the counsel for the water supply company, is in rather bad taste, and that I am not guilty of *willful* mirepresentation at all events.

The correction which should be made on said Plate No. 1 is as follows: Instead of terminating at the circular suction well in front of the engine-house, the conduit, from the crib at the foot of the lake, now actually terminates at the end of the long ten-inch wrought-iron suction-pipe, to which nineteen of the tubular or driven wells are connected. At this point a small plank well, or chamber, extending upwards from the conduit to the surface of the marshy soil, has been constructed, and the said ten-inch suction-pipe enters this well at one end, where the admission of water may be controlled by a ten-inch valve, or gate, as shown in the adjacent diagram. At the time of our inspection, on the seventh instant, this source of supply seemed to be in full operation. Upon opening the well the odor of sulphuretted hydrogen was noticeable, and upon tasting a sample of the water contained therein this gas could also be detected. Two transverse partitions in the well were pointed out by Mr. Kent, and were said to be wire screens; but as the tops of these objects were about one foot *below* the surface of the water, their efficacy appears to be doubtful. Plate No. 1 should, therefore, be corrected by obliterating that portion of the twenty-four inch sheet-iron conduit which extends from the circular suction well to the end of the long ten-inch suction pipe, and by connecting this latter pipe with the conduit from the lake. In all other particulars the diagram is substantially correct.

It will thus be seen that the conduit from the lake terminates at a point about 2,900 feet distant from the pumping engines, and that the water from the lake must flow through the long ten-inch suction pipe before it can reach the pumps. From Mr. Kent's written statements to me last September, it appears that the pump cylinders of the large Holly engine are about seventeen (17) feet above the low water level of the lake. On the seventh instant, however, the surface of the lake was about three (3) feet higher than in September, so that the lift is now about fourteen (14) feet. With these data, and on the assumption that the pumps cannot raise the water higher by suction than twenty-six feet, I compute that the long ten-inch suction-pipe will probably not deliver more than from 900,000 to 1,100,000 gallons of water to the pumps in twenty-four hours, according as the surface of the lake stands at the lower or the higher level. But from the statements, both written and oral, of Mr. Kent, the average domestic consumption of water supplied by the company is about 1,000,000 gallons per day of twenty-four hours, and he also maintains strenuously that this amount of water is furnished by the system of driven wells alone, even during a season of long-continued drought; hence, since the capacity of the long ten-inch suction-pipe is limited as aforesaid, also, since little reliance can be placed on a large yield by flowage only from the series of driven wells in the circular suction well and the small reservoir, it follows that under the present conditions the supply of water from both the lake and the driven wells is still restricted to

about 1,000,000 gallons per day, and that an ample supply for both domestic and fire purposes is not yet available without resorting to the outlet. To make this conclusion more apparent, it may be remarked that if a serious fire should occur in one of the large buildings or factories in the city, at least six streams from the hydrants would be called into operation, and the discharge of these streams would occur at the rate of about 1,100,000 gallons per twenty-four hours; also that during the prevalence of such a fire the domestic consumption would not be abated; and hence that the minimum amount of water available at all times, under existing circumstances, should be the sum of the amounts needed for both domestic and fire purposes, or about 2,000,000 gallons per day. That the designers of the water-works had a similar view in mind is confirmed by the fact that they provided a large pumping engine with a rated capacity of about 3,000,000 gallons per day. It is accordingly obvious that if the existing communication with the outlet be removed, there will be no guarantee of adequate fire protection in the city of Jamestown from the water-works; and, therefore, I do not consider it prudent to cause this source of supply to be destroyed until another source becomes fully available.

In consideration of the foregoing, I would suggest that the connection with the outlet be left in place for a certain period of time, during which the company can make arrangements to obtain an ample supply of wholesome water from some other source. In the meantime, the sixteen-inch gate or valve which controls the admission of water from the outlet into the large suction well should be kept closed and properly sealed, the seal to be broken and the gate opened only in case of extreme necessity to prevent a diastrous conflagration. The manner in which a suitable seal can be applied has already been explained to both the city authorities and the water works officials. Should the seal be broken without cause, as aforesaid, some penalty should be provided, since the water from the outlet can, in my opinion, hardly be classed as pure and wholesome even in the winter season when navigation is suspended.

2d. There seems to be some defect in the present conduit from the lake to the end of the long ten-inch suction pipe referred to above, since the quality of the lake water is manifestly deteriorated in its passage through the same; but just what and where the trouble is, I am unable at present to state definitely. I apprehend, however, that some of the joints in the wooden flume or the twenty-four-inch sheet-iron pipe are defective, and that more or less swamp muck has found lodgment in the conduit. I would therefore suggest that measures be taken by the company to insure the water-tightness of this conduit at an early date, if the quality of the water from the foot of the lake be deemed suitable without filtration. Should such work involve the construction of a new conduit, a strong iron pipe would, in my opinion, be preferable to one of wood or masonry.

3d. Much annoyance from foul water in the "dead-ends" of the distribution system seems to be experienced, also from the manner in which the officers of the company empty and flush their pipes. To remedy these evils, I would suggest that the company be required to erect and freely make use of a suitable fire or flushing hydrant at every such dead-end. By discharging the foul water at the end of the pipe where it becomes foul, and then following up the discharge with a copious flushing of clean water, much better results will be attained than by the methods which are practiced by the water-works officials, as explained to me by them.

4th. I have made a careful microscopical examination of eight samples of water collected at various times between the fourth and eighth instant, both from the outlet, the foot of the lake, and the mains. One of these samples I collected personally on the eighth from the service pipe in Mr. Blackstone's office, after having allowed the water to run at full head for a period of six minutes, during which time the quantity discharged was at least twice as great as the cubical contents of the pipe from the large twelve-inch street main to the faucet. In the course of this experiment the water was always loaded with much floating matter, apparently of vegetable origin, and which was subsequently found to be decayed vegetable structure of various kinds. The remaining samples were collected under the direction of the chairman of the water committee, Mr. E. R. Bootey. Despite the unfavorable season for obtaining specimens of plant life, which flourish best in the summer months, the samples from the lake and the outlet contained a large number and variety of minute algæ, amongst them being species of Lynglya, Protococcus, Nostoc (?) and gelatinous masses containing green and bluish-green cells or spores, which I have been unable to get identified. Some of these specimens I have preserved by Counting on glass slides, and these are at your disposal. The malthrocystis, which I feel positive was in the outlet water last September, did not appear in the sample recently collected. The preparations mentioned were also submitted to two experts in botanical microscopy of this city, and both agree in the statement that the vegetable matter contained in water from the city mains of Jamestown was such as had its origin in a marsh or swamp instead of in deep wells. All of these recent investigations confirm me in the opinion that the water from the driven wells is practically free from vegetable life which would cause any annoyance in the mains, and that the algæ which have found their way into the system of distribution pipes, and have there caused the trouble complained of, came originally from the outlet or the small reservoir, or both. I, therefore, see no reason whatever for altering or modifying the opinions expressed in my former report.

5th. In conclusion, I would add that on the seventh instant the water at the intake from the outlet was standing about thirty inches

deep over the top of the body of gravel which is supposed to "filter" the waters of that stream before being admitted into the suction well at times when this source of supply happens to be in use. It is needless to say that with the existing appliances this plan of purification cannot be regarded as successful when the outlet stands at its present high level.

Respectfuliy submitted,

EMIL KUICHLING,
Civil Engineer.

"C."

REPORT ON THE CHEMICAL EXAMINATION OF SEVEN SAMPLES OF WATER RECEIVED FROM THE STATE BOARD OF HEALTH, DECEMBER 21, 1886.

The following samples of water were received from city of Jamestown and sent to chemist with the numbers marked secretary number:

Sec. No. 1.— On tag: Marked Exhibit 1, C. H. M., Marvin Smith, S. C. J., drawn December 10, 1886, by C. H. Monroe. See testimony, page 281.

On label on bottle: Just as it came from the faucet in Eclip photographic studio, December 10, 1886, drawn by C. H. Monroe.

Sec. No. 2.— On tag: Marked Exhibit 2, E. A. K., Marvin Smith, S. C. J., drawn December 8, 1886, by E. A. Kepler. See testimony, page 282.

On label on bottle: Just as it run from the faucet in B. W. Hayward's barn, December 8, 1886, drawn by E. A. Kepler.

Sec. No. 3.— On tag: Marked Exhibit 3, F. A. D., Marvin Smith, S. C. J., drawn November 10, 1886, by Fred. A. Dorman at Spaulding's Green Houses, Spring street. See testimony, page 294.

On label on bottle: No 1.—(Poison.) Drawn from the city water pipe November 10, 1886. (This is pencil mark.) Cut flowers from the Spaulding Green Houses, 315 Spring street, F. A. D., Jamestown, New York.

Sec. No. 4.— On tag: Marked Exhibit 4, A. W., Marvin Smith, S. C. J., drawn from conduit plank and timber well (testimony, page 276), on the 13th day of December, 1886, by me, Aaron Wilbur. See testimony, page 297.

On label: As taken from the conduit above the pumping wells of the Jamestown Water Supply Company, December 13, 1886, Aaron Wilbur.

Sec. No. 5.— On tag: Marked Exhibit 5, A. W., Marvin Smith, S. C. J., drawn from Third street main, not from dead-end, on 18th December, 1886, by me, Aaron Wilbur. See testimony page 297.

Sec. No. 6.— On tag: Marked Exhibit 6, A. W., Marvin Smith, S. C. J., drawn from the Lake View avenue, dead-end, on 18th December, 1886, by me, Aaron Wilbur. See testimony, page 297.

Sec. No. 7.— On tag: Marked Exhibit 10, A. W., Marvin Smith, S. C. J., as taken from adjacent the crib of Jamestown Water Supply Company, at the foot of the lake, December 18, 1886, by me, Aaron Wilbur. See testimony, page 298.

DR. LEWIS BALCH, *Secretary, Albany:*

DEAR SIR.—I have this day concluded the examination of the seven samples of water sent to me on the twenty-first ult. The bottles were numbered only, and as no particulars concerning the waters were furnished me, I had the results of the chemical examination alone upon which to base an opinion as to their quality or the advisability of employing them for domestic uses, and this is but part of the information which is essential to the formation of an opinion in such cases. Samples numbers 1 and 3 cannot be considered drinking water in any sense of the word. They are loaded with dissolved and suspended matter, and in every way highly offensive and disgusting. The ordinary methods of water analysis can hardly be applied to such liquids as these, and many difficulties were experienced in their examination. These were increased by the small quantity of the samples furnished, which did not admit of their complete examination, nor the repetition of any tests. Some of the results therefore are approximate only. But I did the best that I could with them under the circumstances. They cannot be regarded as "waters," nor judged by any of the ordinary standards. The same may be said, to a less degree, of No 2. A water with such a sediment, and yielding such results on analysis, is evidently unfit for domestic use. With Nos. 4, 5, 6 and 7 the case is different. These would rank as potable waters, and some of them of fairly good quality.

NO. 1, CONTAINED IN A PINT BOTTLE, AND MARKED "NO. 1."

[*All results parts per* 100,000.]

Appearance: Turbid, with sediment filling about one-quarter of the bottle. Color of water, yellowish-brown by transmitted, and greenish by reflected light. Sediment dark greenish-black. Top of liquid covered by an iridescent film, and around neck of bottle a reddish-brown scum had formed.

Odor at 100 deg. F.	Highly disagreeable and offensive.
Chlorine	0.80
Phosphoric acid in phosphates	Very heavy traces.
Nitrates	None. *
Nitrites	.......*

* Quantity did not admit of application or of satisfactory application of test

Free ammonia:	
Settled water	3.6000
Water with sediment	4.5000
Albuminoid ammonia:	
Settled water	0.4000 +
Water with sediment	4.6000 +
Oxygen absorbed	........*
Total hardness	........*
Total solids:	
Settled water	66.40 †
Water with sediment	788.00 ‡
Loss on ignition:	
Settled water	33.80 **
Water with sediment	284.80 ††
Mineral matter (by difference):	
Settled water	32.60
Water with sediment	503.20 ‖

Conclusions: As previously stated, this liquid cannot be considered "water," in any ordinary sense, being entirely unfitted for any use as such. I am unable to account for the small amount of chlorine present. Some difficulty was experienced in reaching a satisfactory determination, as the amount did not permit a repetition of the test, but the quantity does not probably much exceed that reported.

No. 2, CONTAINED IN A PINT BOTTLE, AND MARKED "No. 2."

Appearance: On standing, water became quite clear. It had a yellowish-green tint, sediment filling about one-twelfth of the bottle, brown, flocculent and ropy, with numerous fibres.

Odor at 100 deg. F	Slight.
Chlorine	1.20
Phosphoric acid in phosphates	Very heavy traces. †
Nitrates	Abundant traces.
Nitrites	" "
Free ammonia:	
Settled water	0.0033
Water with sediment	0.0053
Albuminoid ammonia:	
Settled water	0.0170
Water with sediment	0.2950+

* Quantity did not admit of application or of satisfactory application of test.
† Residue, reddish-brown and saline around top of dish.
‡ Residue, reddish-brown.
** Blackening scintillations and disagreeable odor on ignition.
†† Blackening scintillations and disagreeable odor on ignition
‖ Contains much iron.
† From residue on evaporation of water with sediment.

Oxygen absorbed (permanganate):	
After fifteen minutes at eighty deg. F......	........*
After four hours, at eighty deg. F..........	0.4570 ‡
Total hardness..........................	8.5
Total solids:	
Settled water...........................	18.00 †
Water with sediment.....................	45.60 ‡
Loss on ignition:	
Settled water...........................	8.00 **
Water with sediment.....................	24.40 ††
Mineral matter (by difference):	
Settled water...........................	10.00
Water with sediment.....................	21.20

Conclusion: This water in its natural state with the sediment is entirely unfit for domestic use. The settled or filtered water gives better results on analysis but is clearly polluted.

No. 3, Contained in a Half Pint Bottle, and Marked "No. 3."

Appearance: Turbid, with sediment filling nearly half the bottle. Color of water, greenish-brown. Sediment, dark greenish black.

Odor at 100 deg. F......................	Offensive and disagreeable.
Chlorine................................	6.00 †
Phosphoric acid in phosphates............	Very heavy traces.
Nitrates................................	Traces.
Nitrites................................	........*
Free ammonia:	
Settled water...........................	4.3000
Water with sediment.....................	6.7000
Albuminoid ammonia:	
Settled water...........................	0.1600
Water with sediment.....................	5.6000
Oxygen absorbed.........................	........*
Total hardness..........................	........*
Total solids:	
Settled water...........................	54.40 †
Water with sediment.....................	612.40 ‡

* Quantity did not admit of determination.
‡ Amount increased by nitrites present. The clear water tested.
† Residue, yellowish-white.
‡ Residue, light yellowish-white, with brownish patches.
** Slight darkening and slight odor on ignition.
†† Blackening scintillations and unpleasant odor on ignition.
† Approximate at end, reaction not distinct and quantity did not admit of further tests.
* Quantity did not admit of application of tests.
† Residue, brownish-yellow.
‡ Residue, yellowish-brown and brownish-black in patches.

Loss on ignition:

Settled water	31.20 **
Water with sediment	269.60 ††

Mineral matter (by difference):

Settled water	23.20
Water with sediment	342.80 ‖

Conclusions: As in the case of No. 1, this liquid cannot be considered "water" in any ordinary sense, being entirely unfitted for any use as such.

No. 4, CONTAINED IN TWO-QUART FRUIT JAR, MARKED "NO. 4."

Appearance: Quite clear, greenish tint. Slight brownish flocculent sediment.

Odor at 100 deg. F	Very slight.
Chlorine	0.30
Phosphoric acid in phosphates	Bare trace.
Nitrates	Traces.
Nitrites	Traces.
Free ammonia	0.0210
Albuminoid ammonia	0.0060
Oxygen absorbed (permanganate):	
After fifteen minutes of eighty deg. F	0.1657
After four hours of eighty deg. F	0.3214
Total hardness	5.0
Total solids	10.20 †
Loss on ignition	3.80 ‡
Mineral matter (by difference)	6.40

Conclusions: Chlorine and total solids low. Total ammonia high; also oxygen absorbed. Phosphates, nitrates and nitrites present in traces. Evidently polluted. Cannot be considered a safe water.

No. 5, CONTAINED IN A TWO-QUART FRUIT JAR, AND MARKED "NO. 5."

Appearance: Quite clear, greenish tint. Very slight flocculent sediment.

Odor at 100 deg. F	Very slight.
Chlorine	0.40
Phosphoric acid in phosphates	Traces.
Nitrates	Present.
Nitrites	Traces.
Free ammonia	0.0044
Albuminoid ammonia	0.0015

** Blackened, some scintillations and odor on ignition.

†† Blackened, gave off inflammable gas and disagreeable odor on ignition.

‖ Contains much iron.

† Residue light yellowish-white.

‡ Some blackening and slight odor on ignition.

Oxygen absorbed (permanganate)	
After fifteen minutes at eighty deg. F.......	0.1428
After four hours at eighty deg. F...........	0.2714
Total hardness..............................	6.5
Total solids................................	12.90 *
Loss on ignition............................	4.70 †
Mineral matter (by difference)..............	8.20

Conclusions: Chlorine, total ammonia and total solids, low. Phosphates, nitrates and nitrites present in small quantity. Oxygen absorbed would rank it as of medium purity. Of fair quality but not completely satisfactory.

No. 6, CONTAINED IN A TWO-QUART FRUIT JAR, AND MARKED "No. 6."

Appearance: Quite clear; greenish tint. Very slight flocculent sediment.

Odor at 100 deg. F..........................	Very slight.
Chlorine....................................	0.60
Phosphoric acid in phosphates...............	Traces.
Nitrates....................................	Present
Nitrites....................................	Traces.
Free ammonia................................	0.0016
Albuminoid ammonia..........................	0.0025
Oxygen absorbed (permanganate):	
After fifteen minutes at eighty deg. F.......	0.1043
After four hours at eighty deg. F...........	0.2071
Total hardness..............................	6.5
Total solids................................	12.80 ‡
Loss on ignition............................	4.50 ‖
Mineral matter (by difference)..............	8.30

Conclusions: Chlorine, free and albuminoid ammonia and total solids low. Oxygen absorbed would rank it as of medium purity. Phosphoric acid, nitrates and nitrites present in small quantity. Of fair quality although not in all respects entirely satisfactory.

No. 7, CONTAINED IN A TWO-QUART FRUIT JAR, AND MARKED "No. 7."

Appearance: Quite clear; light greenish tint; slight brownish flocculent sediment.

Odor at 100 F...............................	Very slight.
Chlorine....................................	0.35
Phosphoric acid in phosphates...............	Traces.
Nitrates....................................	None.
Nitrites....................................	Faint trace.
Free ammonia................................	0.0180
Albuminoid ammonia..........................	0.0055

* Residue light yellowish-white.
† Blackening and slight odor on ignition.
‡ Residue, light yellowish-white.
‖ Blackening and slight odor on ignition.

Oxygen absorbed (permanganate):

After fifteen minutes at eighty deg. F.	0.0657
After four hours at eighty deg. F.	0.1428
Total hardness	3.°
Total solids	5.60 †
Loss on ignition	2.60 ‡
Mineral matter (by difference)	3.00

Conclusions: Chlorine and total solids, low. Albuminoid ammonia, medium, and free ammonia, high. Oxygen absorbed less than in Nos. 4, 5 and 6. Phosphoric acid traces; nitrates absent and nitrites, faint trace. Were it not for the ammonia would rank as of fair quality.

After a careful consideration of the above results, Nos. 1 and 3 not being considered, I am of the opinion that No. 2 is the most largely pulluted and objectionable; that No. 4 is polluted, but to a much less extent, and cannot be considered a safe water; that Nos. 5 and 6 are of about the same quality, both being fair, but neither entirely satisfactory; and that No. 7 is, in most respects, the best of all, but yields too much ammonia to be considered a good water; aside from this, it is of good quality.

Yours Respectfully,

WILLIS G. TUCKER,
Analyst.

CHEMICAL LABORATORY OF THE ALBANY MEDICAL COLLEGE,
ALBANY, N. Y., *January* 7, 1887.

A number of samples of water were also forwarded by the company, from which an equal number were selected and sent to chemist for analysis. His return shows them to be comparable only with the driven-well water.

The samples selected and sent to the chemist were marked "A" to "G" in the office, and were sent to him only under such mark. The following shows mark under which they were sent to chemist and label on the bottle as received.

Sec. Mark:

A	Marked on label,	6. 12=16=86 4 and 5 P. M.
B	Marked on label,	37. 12=16=86 10 and 11 A. M.
C	Marked on label,	19. 12=16=86 Bet. 10 and 11 A.M.

† Residue almost white.
‡ Slight darkening and very slight odor on ignition.

D......................	Marked on label,	78. 12=17=86 2 and 5 P. M.
E......................	Marked on label,	91. 12=17=86 10 and 12 A. M
F......................	Marked on label,	101. 12=17=86 2 and 5 P. M.
G......................	Marked on label,	Collected from faucet at E. D. Spaulding's green-house, December 20, 1886, F. B. Farnham.

REPORT ON THE CHEMICAL EXAMINATION OF SEVEN SAMPLES OF WATER RECEIVED FROM THE STATE BOARD OF HEALTH, JANUARY 8, 1887.

DR. LEWIS BALCH, *Secretary, Albany:*

DEAR SIR.— I have concluded the examination of the seven samples of water sent to me on the eighth instant. The bottles were marked: "A," "B," "C," "D," "E," "F" and "G," the first six being eight ounce bottles and the last ("G") held a quart. All were sealed with wax, the first six stamped with a letter G, and the last ("G") apparently with a seal of same kind. The quantity, in the case of the first six samples, did not admit of a full analysis, and the examination made is as thorough as I could well make it under the circumstances. The chlorine determinations are sufficiently exact, though they are not precise, as the quantity of water did not admit of its concentration, which is desirable when the amount of chlorine is low. The ammonia determinations were made by operating upon 100 cubic centimeters. Qualitative tests showed the presence of nitrates in all the samples. No accurate determination could be made. No tests for nitrites could be made except in the case of sample "G," in which they were seemingly absent. The conclusions drawn are based on the analytical data alone.

SAMPLE "A." Quantity, eight fl. ounces. (All results, parts per 100,000.)

Appearance: Quite clear; some brownish flocculent sediment.

Odor at 100 deg. F........................	Very slight.
Chlorine................................	0.60
Nitrates................................	Present.
Free ammonia..........................	None.
Albuminoid ammonia....................	0.0040

Conclusions: Quantity of sample admitted of no further tests. Results of examination favorable. Amount of nitrates apparently small.

SAMPLE "B." Quantity, eight fl. ounces.

Appearance: Quite clear; some brownish flocculent sediment.

Odor at 100 deg. F........................	Very slight.
Chlorine	0.60
Nitrates..................................	Present.
Free ammonia..............................	None.
Albuminoid ammonia........................	0.0020

Conclusions: Same as in "A."

SAMPLE "C." Quantity, eight fl. ounces.

Appearance: Quite clear; some brownish flocculent sediment.

Odor at 100 deg. F........................	Very slight.
Chlorine	0.60
Nitrates..................................	Present.
Free ammonia	None.
Albuminoid ammonia........................	0.0016

Conclusions: Same as in "A."

SAMPLE "D." Quantity, eight fl. ounces.

Appearance: Quite clear; slight brownish flocculent sediment.

Odor at 100 deg. F........................	Very slight.
Chlorine	0.60
Nitrates..................................	Present.
Free ammonia	None.
Albuminoid ammonia........................	0.0022

Conclusions: Same as in "A."

SAMPLE "E." Quantity, eight fl. ounces.

Appearance: Quite clear. Some brownish flocculent sediment.

Odor at 100 deg. F........................	Very slight.
Chlorine	0.60
Nitrates	Present.
Free ammonia	0.0005
Albuminoid ammonia........................	0.0015

Conclusions: Same as in "A."

SAMPLE "F." Quantity, eight fl. ounces.

Appearance: Quite clear. Some brownish flocculent sediment.

Odor at 100 deg. F........................	Very slight.
Chlorine	0.60
Nitrates	Present.
Free ammonia	0.0010
Albuminoid ammonia........................	0.0032

Conclusions: Same as in "A."

SAMPLE "G." Quantity, thirty-two fl. ounces.

Appearance: Quite clear. Very slight sediment, consisting of whitish particles.

Odor at 100 deg. F	None.
Chlorine	0.60
Phosphoric acid in phosphates	Bare trace.
Nitrates	Present
Nitrites	None.
Free ammonia	0.0012
Albuminoid ammonia	0.0045
Oxygen absorbed (permanganate):	
After fifteen minutes at eighty deg. F	0.1478
After four hours at eighty deg. F	0.2579
Total solids	13.40 *
Loss on ignition	4.00 **
Mineral matter (by difference)	9.40
Total hardness	8°.0

Conclusions: Chlorine, total ammonia and total solids, low phosphoric acid, bare trace; nitrates, traces; nitrites, absent; oxygen absorbed would rank it as of medium purity (if a surface water). This water, although not in every respect entirely satisfactory, is nevertheless of very fair quality.

* Residue, very light yellowish-white.

** Some blackening with but little odor on ignition.

TABLE OF RESULTS.

[All results in parts per 100,000.]

	A.	B.	C.	D.′	E.	F.	G.
Appearance	Clear; some sediment	Clear; some sediment	Clear; some sediment	Clear; slight sediment	Clear; some sediment	Clear; some sediment	Clear; very slight sediment.
Odor at 100 degrees Fahrenheit	Very slight	Very slight	Very slight	Very slight	Very slight	Very slight	None.
Chlorine	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Phosphoric Acid							Bare trace.
Nitrates	Present	Present	Present	Present	Present	Present	Present.
Nitrites							None.
Free Ammonia	None	None	None	None	0.0005	0.0010	0.0012
Albuminoid Ammonia	0.0040	0.0020	0.0016	0.0022	0.0015	0.0062	0.0045
O. absorbed — 15 minutes							0.1478
O. absorbed — 4 hours							0.2579
Total Solids							13.40
Loss on Ignition							4.00
Mineral Matter							9.40
Total Hardness							80.00

In conclusion it may be said that there is a striking similarity between these waters, both physically and chemically. They all contain practically the same amount of chlorine, and traces of nitrates are present in each. The amounts of free and albuminoid ammonia increased slightly in samples "E," "F" and "G," but are low in all. If any of these waters are polluted they are certainly largely diluted.

Yours respectfully,

WILLIS G. TUCKER,

Analyst.

CHEMICAL LABORATORY OF THE ALBANY MEDICAL COLLEGE
ALBANY, N. Y., *January* 14, 1887.

"D."

DIGEST OF AFFIDAVITS.

The affidavits on the part of the city seek to establish certain points, namely, that it was in the mind of Mr. Kent to use outlet-water; that he has actually done it; that the water was unfit for domestic uses; that it was detrimental to health, and that it was not acceptable to the people. The evidence on each of these points is here given for what it is worth:

1. *That it was in the mind of Superintendent Kent to use the water clandestinely.*

JOHN CONWAY, an employe, as inspector while the works were constructing, and subsequently in charge of the extension of mains and laying service pipes, who had charge of laying pipe to the outlet, swears that after the board of health sealed the gate of outlet-pipe in 1884, Mr. A. F. Kent expressed to him the wish that there was some way to open the gate without breaking the seal; that again late in the summer of that year, after the seal had been broken on account of a fire, and another gate with valve had been put in outlet-pipe, A. F. Kent said he wished there was some way that the gate could be closed and still use the water; that Conway said it might have been done by putting in a "by-pass;" that he then said he wished he had known of it, or thought of it, before we had finished the work.

2. *That outlet-water has been mixed with that from driven wells and furnished to consumers.*

JOHN CONWAY swears that during the summer of 1884 it was used and supplied quite largely to consumers, while the company were persistently and strenuously denying it.

EZRA HIBBARD, engineer, swears that it was used whenever the driven-well supply was insufficient; that it was usually allowed to run in during the night, and that Kent told him it was better to let it run in nights.

CHARLES A. MONROE, photographer, swears that he saw the pipe from outlet discharging into well on May 14, 1885, forenoon; that the water was then full of leaves and grass, and that among other things he noticed the remnants of an old shirt or jacket.

3. *That the water supplied consumers during the six months, more or less, prior to December, 1886, has been offensive to taste, smell and sight, and unfit for potable or domestic uses.*

Dr. WM. MARVIN BEMUS, December 9, 1886, swears that he has not used the water in his family for a year.

EDGAR A. KEPLER, photographer, swears that at no time during the past six months has the water been fit for use in his business.

Dr. WM. P. BEMUS, physician, swears the water was of such a character that he has not used it at his house or in his family, or permitted its use for culinary or drinking purposes for over a year. He said nothing about it in his practice for fear of creating a "scare," but always prescribed other drinks. He does not consider it safe.

Dr. ROBERT N. BLANCHARD swears that he does not use it in his family, and has not permitted its use for about a year.

Dr. HENRY P. HALL swears that for the last two months the water, on account of its offensive smell and the sediment or particles of vegetable matter held in suspension, has been unfit to even bathe in, let alone drink, and that "Exhibit 2, E A K" is a fair sample of its character for the last six months.

CHARLES S. BAKER, a blind man, swears that during past two months the water has been of very offensive smell and taste; its odor was like rotten wood, and when boiling the odor was distinguishable throughout the house.

Dr. GEORGE W. WHITNEY swears that he has seen it running from street hydrants and house water-plugs, that it was sometimes very offensive and disagreeable both to sight and smell, and occasionally apparently clean to sight. Within the last few months has frequently seen it loaded with decaying and putrid animal and vegetable matter, and this not confined to any portion of city.

OWEN JONES, hotel keeper, swears that for the past six months it has been of a very offensive taste and smell, some of the time of a dark, yellowish, muddy color, and again quite red. He does not use it for drinking or cooking purposes.

4 *That the water furnished the city for the last six months, more or less, has not been pure and wholesome, and that its use would prove a menace and danger to health.*

Dr. WM. P. BEMUS (a physician practicing medicine in Jamestown thirty-five years), on December 13, 1886, swears that he, for

over a year, has forbidden the use of the water in his family; that he has always prescribed other drinks for his patients; that he did not consider the water safe.

Dr. ROBERT N. BLANCHARD (health officer of city), on December 13, 1886, swears, that for some six months and more he has given the water supply considerable attention, and that during that period it has not been safe for domestic purposes. He had seen the worst samples of it that day, and would not have tasted it for twenty-five dollars. He has said little about the water; but when occasion required it, he had always advised his patients not to use it.

Dr. HENRY P. HALL, practiced medicine for twenty-eight years, on December 13, 1886, swears, that for the last six months the water furnished by the Jamestown Water Supply Company has been unfit and unsafe to drink, or for culinary use. His horses had frequently refused to drink it, and a patient of his had been made to vomit by the odor produced by heating some of it to remove a plaster. He would not allow a patient to drink it unless it had been boiled and filtered.

Dr. GEORGE W. WHITNEY (practicing medicine since 1852), swears that he has seen many cases of disease of a low grade of fever produced by it, and uniformly advises his patients not to use it. He went so far as to say that during hot weather it was dangerous to use the water even to sprinkle lawns. He had seen many severe cases of fever and blood poisoning produced from using water melted from lake ice taken from the lower end of the lake for drinking purposes.

5. *That it is not acceptable to the community.*

In addition to those who have been already noted as not using it on sanitary grounds:

ADDISON P. SHEARMAN swears that Shearman Brothers, employing sixty hands, do not use it for drinking purposes, but go twenty rods away to get water from a spring.

WILLIAM BLACKSTONE swears that Van Denfrift, employing thirty hands, does not use it for drinking purposes, but goes fifteen or twenty rods away to get water from a spring.

WILLIAM S. GIFFORD swears that the Jamestown Cane Seat Company, employing about sixty hands, do not use the water for drinking purposes, but carry it from wells twenty rods away.

WILLIAM H. BOYD swears that the Jamestown Knitting Mills, employing 100 persons, had seventy-five of their men working on the third floor refuse to drink the water from the summer of 1886, till November, and that since then it has been a constant source of trouble.

JOHN R. STAFFORD swears that the Humphrey House, a hotel accommodating 150 guests, does not use the water for drinking or culinary purposes, but gets it from neighboring driven-wells.

ELIAS F. CARPENTER, of the Jamestown Axle works, employing fifty hands, swears that none use city water.

E. WILKINS, of the firm Ford & Hodgkins, employing twenty-five men, swears that they do not use city water.

CHARLES IPSAN, of the Jamestown Bedstead Company, employing fifty-seven men, swears that they do not use city water.

WM. J. MADDOX, table manufacturers, employing fifty men, swears that they do not use city water.

G. WALTER BARNES, of the Columbia Grain Drill Company, employing twenty-five men, swears that they do not use city water.

JOHN CADWELL, of the Jamestown Wood Seat Chair Company, employing forty-five men, swears that none use city water for drinking purposes.

CHARLES E. PARKS, of the firm of Parks & Hazzard, employing seventy-five persons, swears that they do not use city water for drinking purposes.

S. WINDSOR BAKER, of the Jamestown Cotton mill, employing sixty people, swears that they do not use city water.

WM. L. BUTTS, of the Jamestown Worsted mills, employing 500 hands, swears that they do not drink city water.

CHARLES M. WAITE, of the Breed Furniture Company, employing sixty men, swears that they do not use city water for drinking purposes.

JOHN T. WILSON, manufacturer, employing sixty men, swears that they do not drink city water.

MARIUS GEORGE MARTYN, of Martyn Bros., employing 100 persons, swears that they have city water, but men will not drink it. Obliged to employ a man to carry a supply from a spring at an additional cost of $300 a year.

WM. N. GOKEY, of Gokey & Sons, employing 150 to 175 people, swears that they do not drink city water.

ALBERT N. SHERMAN, of the Sherman House, accommodating 200 guests, swears that they do not use city water for drinking or cooking purposes.

JAMES H. JONES swears that he does not use city water.

The affidavits on the part of the water company seek to establish the facts that since the introduction of their water supply the health of the people of Jamestown has been improved; that outlet water has only been used in case of fire; that the bad taste and odor of the water is owing to the development of algæ in the driven-well supply, to iron rust in the pipes, to the number of dead-ends, and to the negligence of water-takers in not flushing their services before taking the water; that they are doing all in their power to remove these objections, and that the water at present is safe for potable uses.

1. *Regarding the improvement in the public health.*

Dr. F. D. ORMES, Dr. J. W. SCOTT, Dr. W. P. BEMUS, Dr. W. M. BEMUS, Dr. G. W. HAZELTINE, Dr. LABAN HAZELTINE and Dr. A. F. WARD swear that since the introduction of the water supply there has, in their judgment and experience, been a considerably less number of cases of sickness and deaths from zymotic diseases, and that the water has not endangered and does not now endanger the security of life or health in the locality where it is used.

WM. C. J. HALL swears he never heard or knew of any disease, illness or death having been caused by the use of said water.

R. J. FORBES, Rev. N. I. RUBINKAM, F. B. FARNHAM, M. M. BROOKS, SOLOMON JONES, J. HARRY JONES, ROBERT T. HAZZARD, FRANK S. JONES, WM. H. KEELER, all swear that they found the water satisfactory, although it had occasionally a little woody taste.

SIDNEY JONES swears that he has used the water constantly from November 11, 1882, and found it satisfactory; never had a case of sickness from zymotic disease in his family, and thinks there is less in town since the water was introduced.

ALEXIS CRANE makes an affidavit substantially the same.

W. A. KENT presents statistics of deaths at Jamestown before and after the water supply was introduced, to show there has been a diminution in zymotic diseases. There being no records of vital statistics kept prior to the introduction of the water supply, he procured his information for that period from the cemetery records of interments, taking only those who died at Jamestown.

2. *That outlet water has only been used in case of fire.*

A. F. KENT swears that the outlet is not to be used except in case of fire.

3. *That the bad taste and odor of the water is owing to the development of algæ in the driven well supply, and to iron rust in pipes.*

WM. C. J. HALL swears that before the connection with the outlet he found the water at times tasting disagreeably, and found the cause to arise from decayed fresh-water algæ.

Prof. LEEDS, in his printed report, dated May 22, 1886, which is sworn to, makes the same assertion, and proposed as a remedy the covering of the pump well.

4. *That the water is at present safe for potable purposes.*

All the physicians above noted as testifying to the diminution of zymotic diseases, also swear that the water is safe for potable uses.

COMMENTS ON ABOVE AFFIDAVITS.

There seems to be a conflict of medical opinion regarding the purity of the water that has been furnished. While Dr. Blanchard, Dr. Hall and Dr. Whitney swear that it has been unfit and unsafe to drink, or for culinary use, Drs. Ward, Scott, Ormes, W. P. Hazeltine and Laban Hazeltine take the opposite view, and Drs. Wm. M. and Wm. P. Bemus seem to straddle both sides of the fence, the former on the 17th of December, 1886, declaring it safe to use, yet on the ninth swearing that he had not used it in his family for a year; and the latter on the 18th of December, 1886, averring that the use of the water has not endangered life or health, while on the ninth of the same month he swears that he has not used it in his family for a year or prescribed it for his patients, and that he did not consider it safe.

"E."

AFFIDAVITS SUBMITTED BY THE CITY OF JAMESTOWN.

STATE OF NEW YORK:

In the Matter of the Jamestown Water Supply Company.

Before HIS EXCELLENCY THE GOVERNOR and THE STATE BOARD OF HEALTH.

TESTIMONY taken for the information of His Excellency and the State Board of Health, pursuant to a stipulation made and entered into by the City of Jamestown, through its Special Committee of its Common Council; the Jamestown Water Supply Company, through its president and superintendent and its counsel, and the State Board of Health, through its secretary, at Jamestown, on the 7th day of December, 1886; *that the testimony be taken in the form of affidavits, with the same effect as common-law proof, and submitted to the State Board of Health on or before Tuesday, December* 21, 1886.

O. F. PRICE, *Mayor.*

ED. R. BOOTEY, *Chairman Special Water Committee.*

STATE OF NEW YORK,
CHAUTAUQUA COUNTY, CITY OF JAMESTOWN, } *ss.:*

EMIL KUICHLING being first duly sworn says:

I reside at Rochester, New York, and by profession am a civil and sanitary engineer; for thirteen years I was principal assistant engineer of the water works at Rochester and am now a member of the board having charge of its public works, and for the past five

or six years I have been employed by the New York State Board of Health, as a sanitary expert; I was educated at the University of Rochester and the Carerube Polytechnic School, Germany, graduating from the former in 1868 and taking, a year later, the earned degree of civil engineer, and being graduated, with the same degree, from the latter in 1872; I was requested and employed the twenty-seventh of August last by the State Board of Health to examine the water supply of the city of Jamestown, and to report to that board such recommendations as should appear necessary for the conservation of the purity of the potable water furnished that city; for that purpose I have made three visits to Jamestown; the first on September one, when I prosecuted my examination two days; the second on the ninth of that month when I spent one day in such examination, and the third on December seventh, which day I spent in such examination in company with the secretary and assistant-secretary of the State Board of Health, representatives of the city and of the Jamestown Water Supply Company.

I made a report, based upon my examinations in September, to the State Board of Health, bearing date September 30, 1886: all the matters of fact in this report stated as founded on my observation are true, and all other matters of fact I verily believe true, and as to them much of my information came from the officers of the water supply company, who were present the larger portion of the time during my investigations and urged and invited to be present during the whole thereof. Upon one of my September visits, while examining the water at the intake from the outlet, in the presence of Edward R. Bootey and John G. Wickes, referring to the outlet water, the president and superintendent of the water supply company, A. F. Kent, spoke of what an analysis of that water might show, and deponent said no analysis was necessary; that the exercise of practical common sense would convince any one that it was unfit to drink; I then asked Mr. Kent to concede that it was unfit to drink, and he said he would admit it; therefore I did not cause a special analysis of that water to be made.

I know Dr. Albert R. Leeds and have read the analysis of the several samples of water made by him and his report as to the Jamestown water supply as published and contained in a pamphlet promulgated by the Jamestown Water Supply Company, a copy of which is with these papers submitted; I have also read "a chemical. biological and experimental inquiry into the present and proposed future water supply of the city of Albany," made by the said Dr. Albert R. Leeds (to the original of which, on file in Albany, I make reference) and published, with the sanction of his name, in volume VII, No. 10, of "The Journal of the American Chemical Society." I make special reference to the "conclusions" of the doctor from which I quote the following:

"Two classes of considerations must be kept in view in drawing these conclusions; the one relating to the use of a city water

supply for drinking and domestic purposes, and the other * * * its use for laundry and manufacturing purposes. As to the first, no water is fit for drinking and domestic purposes unless it is entirely odorless, colorless, perfectly pellucid and transparent; of no taste, or, if any, a pleasant one, and demonstrably free from all non-organized or organized matters (in the shape of germs) capable of originating disease. Now, it is no proof that these requirements are either unnecessary or exaggerated, that most of the cities of this country and the old world are supplied by water which does not conform to them. Public opinion on these matters has developed aggressive strength only during the last few years, and indeed could not be formed on impregnable grounds, except with the aid of scientific discoveries of the past ten years. Now, that it has been demonstrated that the chief agency in the transmission of cholera, typhoid fever, and zymotic diseases in general, is by means of organized germs diffused in drinking water, the popular demand for sources of water supply demonstrably free from organic impurities is imperative, and legislatures and municipal authorities must obey it. * * * It remains for legislative enactment and a humane and wise public opinion to compel these and other communities to reclaim their sewage, before emptying the effluent waters therefrom into a flowing stream. Simple, economical and completely effectual methods for so doing, are now known and practiced by sanitary engineers. But granting that this is done, the consumer should have the water delivered to him in the limpid and demonstrably pure condition above spoken of. And under no conditions can he be guaranteed in the possession of such a water supply, unless it be thoroughly purified and filtered immediately before use."

Further on, in this paper, Dr. Leeds says: "How near, as a matter of chemical engineering, it may be desirable to realize in practice the supply to a large city of water conforming to the laboratory standard, it is foreign to the purpose of the present article to discuss. But it will be readily seen that this experimental method of water analysis supplies many facts of a practical nature, such as water commissioners demand information upon, whilst chemical analysis, *per se*, supplies such information only obscurely and inferentially."

In this connection I wish to quote from a work entitled "Water Supply" (Balfour Browne, London, 1880, MacMillan & Co., pages 74, 75), in which the author says: "There can be no doubt then, that water can be, and very frequently is, the carrier of the causes of intestinal epidemic diseases; and it would seem that any water into which sewage infected by the discharges of persons suffering from such diseases has found its way, might be the means, if it was subsequently consumed in the course of diet, of propagating these specific diseases. It is upon this ground, as we understand it, that Dr. Frankland—than whom there is no greater chemical authority on any question affecting water supply—is so much opposed to the

adoption of any water for supply into which sewage has been poured. It matters not, if we understand him, that chemical analysis cannot show that the water is an unwholesome one. If chemical analysis shows that the water has been previously contaminated by sewage, that is reason enough for rejecting it as a potable water. If there has been sewage in the water, it may have been unhealthy sewage, analysis cannot say whether it was or was not, and hence the risk. It seems to us, that possibly too great a reliance has been placed by many chemists upon chemical analysis. Common sense is revolted by water which is mixed with sewage, and although common sense is often far behind science, in many cases * * * it runs before. But do not take this estimate of the value of analysis upon our authority. The chemist cannot point to the specific infecting substance, but can tell you whether the water is open to suspicion. Whether it is injurious to health can only be determined by physiological tests. That is the opinion both of Dr. Frankland and of Dr. Alfred Hill."

Before my said report I addressed a communication, bearing date September 18, 1886, to W. A. Kent, treasurer of the Jamestown Water Supply Company, propounding to him certain questions some of which he answered and returned with the communication to me before my report. The following are among such questions, and answers:

Q. How many miles distributing pipes (mains) have you at present? A. Fourteen.

Q. How many fire hydrants? A. One hundred and four.

Q. How many stop valves? A. Forty-two.

Q. How many water services on date? A. About 600.

Q. How many persons served? A. Don't know.

Q. How many gallons of water per day in dry seasons (this past summer) are you actually pumping? A. About 1,000,000.

Q. About how much of this amount is used for manufacturing and power purposes? A. Very little.

Q. What is greatest height to which you lift or pump the water? A. One hundred and eighty-five feet.

Q. How many driven wells on the one line of suction pipe as per enclosed diagram? (meaning line of ten inch pipe shown upon Plate I, accompanying my said report). A. Nineteen. Average depth 110 feet.

Q. Geological strata passed through in driving said wells? A. Sixteen to twenty feet muck and loam; eighty feet clay; and about five to ten feet quick-sand and gravel.

Q. Elevation of suction of Worthington pump in your station above water level in driven wells? A. Twenty feet on September 22, 1886.

Q. Elevation of top of Holly engine pump in your station above same level of water in driven wells? A. Twenty-two feet on September 22, 1886.

Q. Relative elevation of water surface in outlet and driven wells on same date? A. Five feet on September 22, 1886, higher in outlet.

Q. Has the water level in the driven wells fallen since their operation? A. Yes.

Q. Have you any observations or measurements showing any relation between water level in lake and in wells? A. At time we commenced putting them down was about same.

Q. When did the offensive taste and smell, or both, first appear? A. Early in year 1884.

Q. How long did it last? A. Has appeared occasionally ever since.

Q. Have you ever attempted to guage the constant or safe permanent yield of any of the driven wells? A. No.

Q. How do you account for the *explosions* in your pumping station on removal of the valve covers? A. We cannot account for them.

Q. What fall is there from low water surface (present), in lake to bottom of twenty-four-inch sheet-iron pipe in the pump or suction well? A. Seven feet.

(All of such questions and answers are above given except one which was unanswered, and one calling for a description of the "offensive taste and smell" of the water, and one in reference to the connection of "dead-ends" to establish circulation.)

Plate I which accompanies my report is correct and true with this exception discovered on December seventh In the plate a twenty-four-inch sheet-iron pipe is shown leading from the lake to suction-well "C," and a ten-inch suction main 2,488 feet long is shown running parallel with the twenty-four-inch pipe, connecting with about 400 feet of twelve-inch and then continuing to the pumping station "B." I found the twenty-four-inch pipe detached at a point about 2,800 feet from the suction-well "C," and there a well is constructed with which the ten-inch suction main is now connected. This well, constructed of plank and timbers, is a vertical extension of the conduit and is about twelve feet long. The superintendent informed me that certain visible objects in the well were intended as screens, but the water, for a full foot in depth, passes over them, and as screens their operation must be nugatory.

On my last visit I found the conditions, with the foregoing exception, as to this well, to be substantially as detailed in my said report, with the further exception that the conduit from the lake now terminates at this well, and water from the lake, obtained through this conduit, well and suction pipe is now furnished consumers.

This conduit was opened at its junction with this well by the superintendent in my presence and in the presence of others. Upon opening the conduit a marked smell of sulphuretted hydrogen was noticeable. Upon drinking of the water taken from this opening I could taste this gas and discovered the "woody" or "earthy"

flavor in my said report mentioned. On the same day that the conduit was opened, as aforesaid, December seventh, myself and others visited the crib in the lake, in my said report correctly described, and water was dipped from the lake adjacent the crib, and I drank of it. Speaking from the stand-point of appearance, taste and smell, this water taken from the lake, was of a more potable quality than that taken, as aforesaid, from the conduit the same day.

So far as the plan and method of construction is concerned this conduit from the lake, in my opinion as an expert, is not to be recommended.

I would not, as an expert, select or recommend the foot of Chautauqua lake as a source of water supply for Jamestown, except in connection with an adequate system of filtration. Such a system is not provided by the Jamestown Water Supply Company.

EMIL KUICHLING.

Subscribed and sworn to before me, December 8, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

THEODORE E. GRANDIN, being duly sworn, says: I reside in said city of Jamestown, and am thoroughly familiar with Chautauqua lake and its outlet; ever since the spring of 1870 I have been connected with steamers plying the waters of Chautauqua lake and its outlet, from Jamestown to Mayville. Up to 1881 I ran boats of my own, acting both as pilot and captain. In 1881 I became superintendent of the Chautauqua Lake Transit Company, operating from five to seven steamers. This company sold to the Chautauqua Steamboat Company in 1883, and I became, and ever since have been, superintendent of that company, which operates seven steamers.

It became necessary for me to know the actual distances from point to point on said lake, and the relative situation thereof, and the correct soundings of the lake. In the winter of 1874, 1875, in company with George W. Jones, a surveyor, and Henry Shearman, I made a survey of said lake, making my measurements upon the ice, and in June, 1875, I made accurate soundings of said lake, working from a steam yacht. Afterwards I caused a map to be made of the lake from my survey and soundings and measurements, of which, as to measurements, the shape of the lake, the relative situation of its points and bays, and the soundings thereof, Plate I, accompanying the report of Emil Kuichling and in his affidavit hereto annexed mentioned, is a true copy. Said measurements, distances, soundings, the shape of the lake, and the relative situation of its points and bays, are correctly given upon said plate.

The lake lies in a basin, the surrounding hills rising in a gradual slope from its surface, from about 100 to 150 feet at its foot, gradually increasing toward its head at Mayville to 250 or 300 feet, the highest elevation of the surrounding ridge being from one-half to one mile from the shores of the lake. These hills are divided into small farms, and are studded with farm houses and farm buildings. Directly opposite the crib of the Jamestown Water Supply Company is located Fluvanna, and on the same side of the lake is situated Lakewood. There are numerous hotels and summer resorts all along the shores of the lake, the ones most populous during the summer months being Lakewood and Chautauqua, the first being about a mile above the crib and the latter on the same side of the lake but at the other end. The average daily population of Chautauqua during the summer season is 12,000, often more, and Lakewood, with its hotels and boarding houses, during the season, not far from 2,000. The entire sewage systems of both these places, as well as the others of lesser population, empties into the lake. I do not think the average depth of the lake is fifteen feet. There is not twenty-five acres of hard ground in its bottom. It is an easy matter to thrust a pole ten feet into its soft bottom. This soft bottom is universal, except along its immediate shores, in few places, throughout the whole of the foot of the lake. In the colder months the bottom is carpeted with a remarkably thick growth of "rushes," "pickerel weeds," "puss-tails," and a half-dozen more, in length from two to four feet. As the water warms in the summer these weeds ripen and rot, the waves and the steamers "churning" the mass and detaching the seeds and breaking up the frailer and rotted vegetation, until the surface of the water is covered for full six weeks with the floating and sprouting seeds and broken and lighter portions of the weed itself. The water, which is a dark-green in the winter, soon gradually changes to a yellowish-red, and by fall has become a greenish-blue. The current of the lake is hardly perceptible.. It is queer; persons have been drowned and their bodies found miles *up* the lake from place of drowning in from fifteen to thirty feet of water. The outlet is from six to twelve feet deep from Jamestown landing, adjacent the water-works, to the lake, and is nothing more nor less than a stagnant mud-hole. From this landing to Grass island, which is above the crib, we find the shallowest portions of the water. There is about six or eight feet of water and about ten or twelve feet of mud. The nearest point that steamers run to the crib is about one-fourth of a mile, and they could not run much closer. On our line of steamers last season we estimate that we carried 212,000 people, and taking the other steamers into consideration increases this sum materially. The entire sewage of the steamers, of course, finds its way into the lake. During the busy season all steamers (last year, in July and August, nine in all) make two round trips each day, making their

turn at the Jamestown landing. This makes thirty-six steamers through the outlet each day, and thirty-six turns each day. The outlet at the landing, from dock to dock, is about 160 feet, and three of our steamers are over 150 feet long, two over 100 and under 150, two over seventy-five and less than 100. In turning, the bow of a steamer is made fast to the dock, the helm put hard over and the boat worked round by the action of the wheel. This keeps the outlet constantly stirred up and as muddy as it is well possible to make it. Within the past eight years—I think eight years ago—we cut a slip opposite the docks, at right angles with the outlet, 200 feet long, fifty feet wide and eight feet deep, and from this slip the water supply company have taken all the outlet water it has used. The water in this slip is more stagnant and muddy than that in the outlet. The action of the boats, in making the turn I have described, has filled this slip up five feet, the head entirely, with mud from the outlet bottom; so that now, where it was eight feet deep from the surface of the ground, it is but three feet. Of course the depth of water would be less than three feet where it has filled five.

T. E. GRANDIN.

Subscribed and sworn to before me, December 9, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK, CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

WILLIAM MARVIN BEMUS, being duly sworn, says: I have been a practicing physician and surgeon, residing at Jamestown, for the past eight years. During the year 1884 I was health officer of the village of Jamestown, and was such health officer of said village from 1879 until the village became a city, in 1886, when I was appointed a member of the board of health.

In the summer of 1884 the purity of our water supply was questioned, and the company was charged with using the outlet water through its intake at the slip, described by T. E. Grandin in his affidavit annexed, which was put in, as was advertised, for fire protection only. The company denied using the outlet water except only for fire purposes; but the public would not be convinced of the truth of the denial, and the board of health was importuned to take some action. At the suggestion of A. F. Kent, superintendent of the company, that the public might be convinced that the outlet water was not being used, the board of health sealed the gate at the outlet intake. The sealing of the gate, the people complained,

did not make the water any better. The seal remained on the gate, unbroken, as far as I know, for some time — until the next fire.

I drew some water to-day from a main on one of the principal streets, East Third, and this water was of a particularly unpleasant taste; I can describe it by no better word than nasty, and the odor was no better than the taste. I have used the water in my family, but have not for a year.

WM. MARVIN BEMUS.

Subscribed and sworn to before me, December 9, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CHAUTAUQUA COUNTY, CITY OF JAMESTOWN, } *ss.:*

JOHN CONWAY, being duly sworn, says: I am now in the plumbing business, and I have, since 1864, with the exception of about two years, been engaged in the superintendence and construction of water-works, and I was employed by the Jamestown Water Supply Company, as inspector, when its works were constructing, and after that and until July, 1885, I had charge of the extension of mains and laying of service pipes.

I had charge of laying the pipe from the suction well to the outlet intake at the steamboat slip. The pipe is a sixteen-inch pipe and the gate is of the same size. The gate is operated by a key wrench and screw spindle. It operates upon the same principle as a Ludlow water gate valve.

The pipe from the intake to the well has a slight fall. It is a gravity pipe. I remember the fact that the local board of health sealed this gate in the summer of 1884. I saw the seal. While the gate was sealed A. F. Kent, superintendent of the water company, said to me that he wished there was some way to open the gate without breaking the seal. I said that I could open it without breaking the seal.

One time, when there was a fire, I understand that the seal was broken. The gate that was sealed is the gate near the suction well.

After this seal was broken, I think late in the summer of 1884, I put in the outlet pipe another gate, with the same kind of a valve, between the gate that was sealed and the intake.

After this gate was in I had a conversation with A. F. Kent. He said he wished there was some way that the gate could be closed and still use the water. I said it might have been done; that we could have put in a "by-pass." He then said that he wished he had known it or thought of it before we had finished the work.

I do not know whether Mr. Kent ever put in a "by-pass" or not.

I know that during the summer of 1884 outlet water was used and supplied consumers quite largely, and I know that when it was being used the company persistently and strenuously denied it.

JOHN CONWAY.

Subscribed and sworn to before me, December 9, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK, CHAUTAUQUA COUNTY, CITY OF JAMESTOWN, } *ss.:*

EZRA HIBBARD, being duly sworn, says, I reside in Jamestown and am an engineer by profession and commenced to work for the Jamestown Water Supply Company when it commenced business and remained in its employ until July 31, 1885, during which time I was the company's engineer at the pumping station. After the main to the outlet was put in, ostensibly for fire purposes, the outlet water was used as a part of the water supply whenever the wells did not furnish enough. We used very often to open the outlet gate at night and let the water run in the well during the night and close the gate in the morning. Mr. A. F. Kent said we had better let the water in nights; we once in a while, however, had to use it in the day-time. I remember times when the public have accused the company of using outlet water and the company denied it. At this time when the use of it was denied the company used this water. The seal put on by the local board of health was on the gate for, I think, two months. I took pains not to go near the gate to ascertain whether it was open or not. I know the seal was not broken until we broke it for a fire. After that we used outlet water, but not so much as before.

In July, 1885, the employes at the pumping station could not drink the water and were in the habit of getting our supply from a neighboring spring. Mr. A. F. Kent about a week before July 31, came up from the cellar of the pumping station and asked me what was in a jug we had down there; I told him it was spring water; he said that it would be a fine thing to go into the papers; I told him it would not get into the papers for they wouldn't know anything about it; he said it would and I would tell of it; I said I would not tell of it nor would I drink his water as it was then; he said I would drink it if I staid there; I told him I wouldn't drink it, nor he couldn't choke it down me or my family; when the month was up I was discharged.

During the fore part of the summer I gave some ladies some water out of a pail. This got to Mr. Kent and he gave me a "combing down for it."

E. W. HIBBARD.

Subscribed and sworn to before me, December, 9, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CHAUTAUQUA COUNTY, CITY OF JAMESTOWN, } *ss.:*

CHARLES H. MONROE, being duly sworn, says: I reside in Jamestown and am a photographer by profession and am somewhat interested in athletic sports which takes me frequently to the boat-landing and outlet.

That in May, 1885, the Jamestown Water Supply Company was accused by the people and the press of using the water of the outlet of Chautauqua lake for domestic supply. This the company repeatedly and strenuously denied.

That on the 14th of May, 1885, in the forenoon, I visited the water-works and found the water in the section well roily and filthy and the pipe leading from the outlet intake to this well was then discharging into the well. I noticed the water running in from the outlet was full of leaves and grass, and among other things that was discharged was the remnant of an old shirt or working jacket. I called the attention of Superintendent Kent to these facts and he said the water was running in from the driven well reservoir which was higher than the suction well and the force of the water roiled the sediment in the bottom of the well. I told him I knew the water was being taken from the outlet, and if he would come with me I could demonstrate it from the visible suction at the outlet intake. I made an affidavit of these facts, which was published at the time, and never denied

This water is now so bad that we have great difficulty in using it in our business, and this fact has led me to investigate it perhaps more than I otherwise should. It is worse now than at any time for six months. It colors our prints and makes them yellow, and all negatives have to be laid film side down in our negative trough; a sediment destroys the film.

I drew the bottle of water from our studio water-plug December 10, 1886, which is marked "Exhibit I, C. H. M.," and the contents thereof, after over two days in which to settle, contains two inches of dark brown sediment, and is of offensive smell, and is just as it came from the plug. Our supply does not come from a "dead-end," but from the Third street main, one of the principal mains of the city.

On said fourteenth of May the steamer Mayville was undergoing repairs in the slip and many workmen were engaged therein and they used the steamer "closet," which emptied perhaps twenty-five feet from the intake, and within three feet from the intake, where the water was but two or three inches deep and the mud five or six feet, was a school of "polywogs"; the water was full of and black with them, and a great many must have been drawn into the well.

CHAS. H. MONROE.

Subscribed and sworn to before me, December 13, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

EDGAR A. KEPLER, being duly sworn, says he resides in Jamestown and is a photographer by profession. That at no time during the past six months has the water furnished by the Jamestown Water Supply Company been fit for use in his business. That he has seen a bottle of water, etc., marked "Exhibit I, C. H. M." and such a combination has been frequently drawn from the supply plug in his gallery. That on December 8, 1886, he drew the contents of a bottle marked "Exhibit 2, E. A. K." from one of the principal water mains, not from a "dead-end." After two days settling this bottle contains a full half inch of flaky light brown sediment. That deponent has frequently drawn water of just such an appearance, and there has been scarcely a day in six months but that the water has been as bad as this specimen, and oftentimes much worse.

E. A. KEPLER.

Subscribed and sworn to before me, December 13, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

WELDON A. DICKSON, being sworn, says: I reside at Jamestown and am a physician and surgeon. I have seen "Ex. 2, E. A. K.," and "Ex. 1. C. H. M.," referred to in the foregoing affidavit of Edgar A. Kepler. Exhibit 2 is a fair sample of water that I have frequently drawn and seen drawn from the principal water mains of the city within the past six months. Exhibit 1 contains more

sediment than any specimen I have ever seen, but sediment of the same character is of frequent occurrence. The water this day is no better as to appearance, taste and smell than is Exhibit 2.

WELDON A. DICKSON.

Subscribed and sworn to before me, December 13, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK, CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

WILLIAM P. BEMUS, being duly sworn, says: I have practiced medicine at Jamestown thirty-five years. The water furnished by the water supply company is of such character that I have not used it at my house or in my family, or permitted its use, for culinary or drinking purposes for over a year. The water for the past six months and more has been of a suspicious color, unpleasant both to taste and smell. I have frequently seen such samples as "Ex. 1, C. H. M.;" and "Ex. 2, E. A. K." is a fair sample as to color, taste and smell, of the water as it has been for months and as it is to-day. In my practice I have said nothing as to city water for fear of inaugurating a "scare," but I have always prescribed other drinks. I do not consider the water as safe. It certainly is not palatable or potable.

W. P. BEMUS, M. D.

Subscribed and sworn to before me, December 13, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK, CITY OF JAMESTOWN, COUNTY OF CHAUTAUQUA, } *ss.:*

ROBERT NEWLAND BLANCHARD, being duly sworn, says: I am a physician and surgeon and am health officer of the city of Jamestown, and, as such, for some six months and more have given our water supply considerable attention. The water for the past six months has been neither potable nor safe for use for domestic purposes. I have seen the worst samples of the water to-day that I ever have seen. It was fairly filthy and contained a deposit of a mass of a reddish brown in color. As to odor it was very unpleasant, and I would not have tasted it for twenty-five dollars, so I know not its taste. This particular sample was drawn from the pipes in Allan's Opera House. "Ex. 2, E. A. K.," is as good, as to color, taste and smell, as the water has been within six months, and better than it is to-day. I have frequently seen as bad and worse specimens

than "Ex. 1, C. H. M." It is no exaggeration. In my practice, for fear of causing alarm I have said little about the water, but when occasion requires I have always advised my patients not to use it. I do not and have not for about a year permitted its use in my family.

R. N. BLANCHARD, M. D.

Subscribed and sworn to before me, December 13, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, COUNTY OF CHAUTAUQUA, } *ss.:*

HENRY P. HALL, being duly sworn, says: I reside at Jamestown, and have been a practicing physician and surgeon for past twenty-eight years; for the last six months the water furnished by the Jamestown Water Supply Company has been unfit and unsafe to drink or for use in culinary pursuits; for the last two months the water, on account of its offensive smell, and the sediment or particles of vegetable matter held in suspension, has been unfit to even bathe in, let alone drinking it; "Exhibit 2, E. A. K.," is a fair sample of the water for last six months; it has occasionally for a day been better but often worse; "Exhibit 1, C. H. M.," is not an exaggerated sample; I have seen just such appearing water containing as much matter in suspension when first drawn every week for months; I have seen as bad taken from plug in my own barn; frequently my horses have refused to drink it; one of them refused to drink to-day, and we had to take him to watering trough full eighty rods from barn; last week I heated some water drawn from one of the principal mains to saturate a sponge to remove a plaster upon a patients face; the odor of the heated water produced vomiting in the patient; my water in use at barn is on one of the principal mains; I will not allow a patient to drink the water unless it is filtered and boiled.

H. P. HALL.

Subscribed and sworn to before me December 13, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

CHARLES S. BAKER, being duly sworn, says: I reside in Jamestown; I have noticed the condition of the city water for the past six weeks or two months; I am blind and therefore do not know

as to its appearance, but as to its taste and odor I am informed; during the last two months the water has been of a very offensive smell, and its taste and odor has been like unto rotten wood; when the water was boiling this odor was distinguishable throughout the whole house; I have noticed these facts in several places.

CHARLES S. BAKER.

Subscribed and sworn to before me, December 14, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.*:

GEORGE W. WHITNEY, being duly sworn, says: I reside at Jamestown and have been a practicing physician and surgeon since 1852; I have taken particular notice of the water furnished by the Jamestown Water Supply Company in various portions of the city for the past six months and more; I have seen it running from street hydrants and house water plugs many times in many places, and it was sometimes very offensive and disagreeable, both to sight and smell, and again, occasionally, it has been apparently clean water to the sight; I have seen many cases of disease of a low grade of fever produced by it and uniformly advise patients not to use it; I have frequently seen the water loaded with not only decaying, but putrid, animal and vegetable matter, and this has not been confined to any one portion of the city and has happened many times within the last few months; "Exhibit 2, E. A. K.," is better than an average of the water as it has been for last two months; "Exhibit I. C. H. M.," is by no means an exaggerated case; I have frequently seen as bad within two months and have seen worse; I have gone so far as to say that during the hot weather it was dangerous to use the water even to sprinkle lawns, and have so warned my friends and neighbors; I was reared on the shores of Chautauqua lake and am particularly familiar with it; the lake from the narrows to the outlet is shallow with muddy bottom; the prevailing winds are mostly down the lake, roiling the water for days at a time so that it is thick and muddy; for the last few years a large fleet of steamers have traveled the lake in all directions, making the lake the larger portion of the time during the season, extremely muddy; that the natural drift of the lake from Lakewood is down the shore to the company's crib; during the summer and during the winter gas from decomposing vegetable and animal matter is constantly rising from the bottom of the lake; I have seen many severe cases of fever and blood poisoning produced from using the water melted from lake ice taken from the lower end of the lake for drinking

purposes; the outlet of the lake from its foot to the boat landing is a "*slough*," and there is no doubt but that at one time the lake itself extended beyond the landing, but in the course of time the silt was piled up on either side of the outlet, at last cropping out of the water, being held together by vegetation, until we have the low morass or quagmire that now lies on either side of the outlet, often overflowed, from the landing the greater portion of the way to the lake of considerable width, narrowing in width till the foot of the lake is reached; through this morass the conduit from the lake is laid; there is no doubt but that through this bog and under it the lake and the company's driven wells have an intimate relation; this is demonstrated not alone by the character of the bog, but by the comparative levels of the water in the wells and the lake; the water level in the wells rising and falling with the rise and fall of the lake.

G. W. WHITNEY, M. D.

Subscribed and sworn to before me, December 14, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

OWEN JONES, being duly sworn, says: I am the proprietor of the European Hotel located near the railway station in Jamestown; I use the water of the water supply company in my hotel, but not for cooking or drinking purposes; I am supplied from a principal main, not from a "dead-end"; the water for the past six months and more has been of a very offensive taste and smell; some of the time of a dark, yellowish muddy color, and again it is quite red. At times we have difficulty in getting water fit to mop with; I have often seen worse mixtures than "Exhibit 1, C. H. M." come from the pipes in the last two months; "Exhibit 2, E. A. K." is an average sample of the water, but is rather better as to color; the water to-day smells as does a pond on a warm murky day; I haven't tasted it and don't intend to; to-day the water is yellow. The color is between the two exhibits after they have settled.

OWEN JONES.

Subscribed and sworn to before me, December 14. 1886.

MARVIN C. SMITH,
S. C. Judge.

STATE OF NEW YORK, City of Jamestown, Chautauqua County, } ss.:

Addison P. Shearman, being sworn, says he is of the firm of Shearman Bros., manufacturers of upholstery at Jamestown; that over sixty people are connected with his establishment, and city water is not used therein, by any of them, for drinking purposes; our water for drink at the factory is carried twenty rods from a spring.

A. P. SHEARMAN.

Subscribed and sworn to before me, December 17, 1886. }

Marvin Smith,
S. C. Judge.

Chautauqua County, *ss.*.

William Blackstone, being duly sworn, says he is treasurer of the Van Derfrift Manufacturing company, of Jamestown; that connected with his company's factory there are over thirty people; we obtain our drinking water for use at the factory from a spring fifteen or twenty rods away; city water is not used at the factory for drinking purposes by any one.

W. A. BLACKSTONE.

Subscribed and sworn to before me, December 17, 1886. }

Marvin Smith,
S. C. Judge.

Chautauqua County, *ss.:*

William S. Gifford, being duly sworn, says: I am one of the proprietors of the Jamestown Cane Seat Chair company, which employs about sixty men; city water is not used in our factory by the employes for drinking purposes. Water for that purpose is brought from neighboring wells, none of which are within twenty rods of the factory.

WILLIAM S. GIFFORD.

Subscribed and sworn to before me, December 17, 1886. }

Marvin Smith,
S. C. Judge.

STATE OF NEW YORK, City of Jamestown, Chautauqua County, } ss.:

William H. Boyd, being duly sworn, says: I am foreman of the Jamestown Knitting Mills with which establishment there are connected over 100 persons; on the third floor of the mill there are about

seventy-five employes; last summer the employes on the third floor refused to use the city water and we carried water from a flowing well until about first of November and then turned on the city water; they have been using it since but it is a source of constant trouble; if we were on the ground floor we should carry the water from the well, but it is too much of a chore and takes too much time from other work to keep a supply of well water.

W. H. BOYD.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

JOHN R. STAFFORD, being duly sworn, says: I am the clerk at the Humphrey House in Jamestown, one of the leading hotels and capable of entertaining 150 guests; this hotel does not use city water either for drinking or cooking purposes; it gets its supply from a neighboring driven well.

J. R. STAFFORD.

Subscribed and sworn to before me, December 17 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK, CITY OF JAMESTOWN, CHAUTAUQUA COUNTY. *ss.:*

E. F. CARPENTER, being duly sworn, says: I am one of the proprietors of the Jamestown Axe Works which employs over fifty persons, none of whom at the factory use city water for drinking purposes; the employes carry their water from a well.

ELEAL F. CARPENTER.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

E. WILKINS, being duly sworn, says: I am one of the employes of Ford & Hodgkins, table manufacturers employing about twenty-five men at their factory in Jamestown; the employes do not use

the city water for drinking purposes at the factory; they get their supply from a neighboring well; it makes one sick to drink the water.

E. WILKINS

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

CHARLES IPSON, being duly sworn, says he is one of the proprietors and superintendent of the Jamestown Bedstead company, which at the present time employs fifty-seven men. None of the employes use city water for drinking purposes. They bring their water at present from a spring about 600 feet from the factory.

CHAS. IPSON.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, *ss.:*

WILLIAM J. MADDOX, being duly sworn, says he is one of the proprietors of Phillips, Maddox & Co., table manufacturers, at Jamestown, which concern employs about fifty men, none of whom, at either of our factories, use city water for drinking purposes. We get our factory drinking supply from other sources, neighboring springs and wells.

W. J. MADDOX.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

G. WALTER BARNES, being duly sworn, says: I am the foreman of the paint room of the Columbia Grain Drill Company which employs about twenty-five men. The employes of the factory do not use city water for drinking purposes. Their supply is obtained from a neighboring well.

G. W. BARNES.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

JOHN CADWELL, being duly sworn, says: I am one of the proprietors of the Jamestown Wood Seat Chair Company which employs, at its factory, about thirty men, and at its warerooms about fifteen. None of our employes at the factory or ware rooms use city water for drinking purposes. They obtain their supply from neighboring springs and wells.

JOHN CADWELL.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, *ss.:*

CHARLES E. PARKS, being duly sworn, says he is of the firm of Parks & Hazzard, manufacturers of boots and shoes at Jamestown. We employ, at our factory, about seventy-five persons, none of whom use city water at the factory for drinking purposes. We get our supply for that purpose from a well about twenty rods away.

CHAS. E. PARKS.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

S. WINSOR BAKER, being duly sworn, says: I am assistant superintendent of the Jamestown Cotton Mill, which employs about sixty people at its factory; none of our employes use city water at the factory for drinking purposes; we get our supply from a spring.

S. WINSOR BAKER.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

WILLIAM L. BUTTS, being sworn, says: I am a bookkeeper at the Jamestown Worsted Mills, which employs about 500 people at its mills; the employes of the mill do not use for drinking purposes at the mill the city water; they get their supply from springs.

W. L. BUTTS.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

CHARLES M. WAITE, being duly sworn, says: I am bookkeeper at the furniture factory of the Breed Furniture Company, at Jamestown, which employs at its factory about sixty men; our employes at the factory do not use city water for drinking purposes; they get their supply from a spring about forty rods from the factory.

CHARLES M. WAITE.

Subscribed and sworn to before me, December 17, 1886. }

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

JOHN T. WILSON, being duly sworn, says: I am a manufacturer at Jamestown, of lumber, sash, doors and blinds and employ about sixty men; none of my employes at the mill use city water for drinking purposes; they get their supply from a neighboring spring.

JOHN T. WILSON.

Subscribed and sworn to before me, December 17, 1886. }

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.:*

MARIUS GEORGE MARTYN, being duly sworn, says: I am of the firm of Martyn Bros., upholsterers and manufacturers of furniture at Jamestown. Our firm employs about 100 persons at the factory. We have the city water all through our factory. None of our employes drink the city water at the factory. It was intended, when we piped our buildings, to use it, and for some time it was used. We soon noticed, however, that our people interrupted their work and went to neighboring wells for water. We could not afford this, and put a stop to it, and employed a man whose business it is to keep the factory supplied in drinking-water. We get our supply from a spring about fifty rods from the factory. If our city was supplied with a potable water that our employes would accept it would save our firm at least $300 a year. We had a well at the factory which we filled up at the completion of the water-works. My own family reside at the third floor, up, of one of our factory buildings, and we carry our water from this well for cooking and drinking, although we have the city water upon this floor. Often times the water has been unfit for use in the bath-tub, and we have had to go down three flights of stairs for our supply.

I understand that the trouble with a drinking-water supply that we have had in our factory has been universal through the various factories in the city.

M. G. MARTYN.

Subscribed and sworn to before me, December 17, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.*:

WILLIAM N. GOKEY, being duly sworn, says: I am of the firm of N. W. Gokey & Son, wholesale boot and shoe manufacturers at Jamestown. We employ in our factory from 150 to 175 people. None of our employes drink the city water at our factory. We get our supply from a driven well. Our factory building is piped for city water, but we do not use it for drinking purposes.

WM. N. GOKEY.

Subscribed and sworn to before me, December 18, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, *ss.*:

ALBERT M. SHERMAN, being duly sworn, says: I am proprietor of the Sherman House, the principal hotel in Jamestown, capable of accommodating 200 guests. I do not use the city water for drinking or cooking purposes. I did at one time, but get my present supply from a driven well.

A. M. SHERMAN.

Subscribed and sworn to before me, December 18, 1886.

MARVIN SMITH,
S. C. Judge.

CHAUTAUQUA COUNTY, *ss.*:

JAMES H. JONES, being duly sworn, says: I am the proprietor of a livery, sale and boarding stable in Jamestown, located on East Third street, and have been such proprietor, nearly five years. At one time I put in a hydrant in my barn for a city water supply. I have in the barn a driven well, which I permit from ten to twenty neighboring families to get their supply and which I use to water my stock. A. F. Kent, superintendent of the water

supply company, came to me and said my well must be a good deal of bother to me on account of so many people running to it, and I had better take out my pump and put in another hydrant.

J. H. JONES.

Subscribed and sworn to before me, December 18. 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

FRANK H. WHITE, being duly sworn, says: I am of the firm of F. H. & W. A. White, proprietors of the "Eclipse Printing & Publishing House," located at Jamestown. That his firm compiled, after a careful canvass, and with previous experience, a directory of the city of Jamestown, which was published in September, 1886, the canvass being made in August of that year. Our firm has had large experience in publishing advertising matter to be used in what we call "billing the town." Our experience has shown that there are nearly, if not quite 3,000 dwelling-houses in the city of Jamestown. This is exclusive of business blocks and buildings many of which in their upper floors are used as dwellings. I am confident this is a fair estimate. Based upon our last directory canvass, we estimate that Jamestown has a permanent population of from 15,000 to 17,000. I think the population nearer the latter than the former sum.

The following is a correct list of the streets of the city.

(A list of the streets of Jamestown here follows).

The following is a substantially correct list of the business men and establishments of the city (we intended it to be correct) in September, 1886. There have been some additions since then.

(Here follows a list of the business men and establishments of the City of Jamestown).

I have looked this list over and I find there should be some erasures and some additions to make it correct to-day but there are as man additions as erasures that should be made.

F. H. WHITE.

Subscribed and sworn to before me, December 18 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } ss.:

FRED. A DORMAN, being duly sworn, says: I am an employe at the Spaulding green houses, situated on Spring street, in Jamestown, between Third and Fourth streets. Our green houses are connected with the city water supply by a direct connection, running down an alley, with the Fourth street main, one of the principal mains of the city—not a "dead-end." We use, on an average, per day from this water connection at the green houses five barrels of water. An inch supply pipe runs south from the Fourth street main, and before the pipe reaches our green houses, a pipe runs east and supplies Deluge engine house, and one runs west and supplies a residence.

From our supply pipe on November 10, 1886, I drew about two o'clock P. M., a quantity of water, of which a bottle marked "Exhibit 3, F. A. D.," is a part. The contents of this bottle is just as it came from our water plug. We have frequently had just such occurrences. This sample is no exaggeration of what has occurred as often as once a week for last two months.

Mr. A. F. Kent, superintendent of the water supply company, came to our green houses, I think day before yesterday, the sixteenth instant, and took away a white square bottle of water, about a pint. This is the only time he has been to the green houses this week. He drew the sample in the afternoon of that day and from the same pipe from which I drew "Exhibit 3, F. A. D." He let the water run fully twenty minutes before he collected his said sample. Before he collected his sample the water had considerable light, fluffy vegetable matter in it held in suspension. There was enough of this matter in it so that if permitted to settle in a bottle like exhibit three, it would cover the bottom of it. His sample was not a fair sample, nor fairly collected.

F. A. DORMAN.

Subscribed and sworn to before me, December 18, 1886.

MARVIN SMITH,
S. C. Judge.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } ss.:

BEN. S. DEAN, being duly sworn, says: I am one of the proprietors and have been one of the proprietors of "The News," a morning newspaper published at said city of Jamestown since the month of December, 1885, during all of which time I have been the editor thereof. That at one time our newspaper commenced to agitate the question as to the wholesomeness and purity of the water furnished con-

sumers by the Jamestown Water Supply Company. Our paper kept up the agitation for some months and charged the water company, on what we considered ample proof, with furnishing impure and unwholesome water. This charge, in varied language, was repeatedly made in editorials from time to time.

In the month of August, 1886, the water company caused to be published and widely circulated a pamphlet, entitled on its cover, "A reply from the Jamestown Water Supply Company, to the charges of certain newspapers." One of those pamphlets is hereto annexed marked "Exhibit 7, B. S. D." This pamphlet purports to quote our newspaper, but the quotations are not fairly made. What quotations are made are literal as far as they go, but "unstarred" sentences are omitted and that which should precede or follow studiously ignored.

Right on the heels of the circulation of this pamphlet, and on or about the 14th day of August, 1886, the Jamestown Water Supply Company commenced an action in the Supreme Court of this State against two of of the publishers of said newspaper, of which I was one, demanding judgment for $10,000, basing their action upon the falsity of many of our numerous newspaper utterances. In this action the water company procured to be granted an order of arrest by virtue of which both defendants therein were arrested. Of the papers that were served upon me in said action, when I was arrested, the annexed paper, marked "Exhibit 8, B. S. D.," purporting to be a copy of an affidavit made by A. F. Kent, was one.

The fact that this action was commenced and said arrest made was given wide circulation.

At the time of the commencement of this action I did not know a person connected with the water company, nor had I ever spoken to one, nor did I know the name of a person connected therewith except the name of "Kent," but I did not know which Kent. All our publications were made in good faith as a public newspaper without thought of gain or reward.

After the commencement of said action we did not stop the agitation of the water question, but kept right on telling the truth as we understood it. We never answered to the complaint in the action, but about a month ago the water company made overtures to discontinue to which, after some considerable urging, I consented. I wanted the action tried.

The day or the day after my arrest I employed Aaron Wilbur to look up evidence to use on the expected trial of said action.

BEN. S. DEAN.

Subscribed and sworn to before me, December 18, 1886.

MARVIN SMITH,
S. C. Judge.

SUPREME COURT — CHAUTAUQUA COUNTY.

JAMESTOWN WATER SUPPLY COMPANY, *against* FRANK D. LOCKWOOD AND BENJAMIN S. DEAN.	*Exhibit* 8, *B. S. D.*, *Marvin Smith*, *S. C. J.*

CHAUTAUQUA COUNTY, CITY OF JAMESTOWN, *ss.:*

A. Flynn Kent, being duly sworn, says that he resides in the city of Jamestown, and has ever since its incorporation as a city; that before such incorporation he resided in the village of Jamestown, N. Y., the same now known as such city, for many years; that deponent has been connected with said plaintiff ever since its incorporation, as an official thereof, and has had principal charge of its works and business, and that deponent has heard read the complaint in this action and knows the contents thereof.

Deponent further says that said plaintiff was incorporated in the year 1882, and thereafter located its works in said village, at the place called the boat-landing, where such works were soon constructed by said plaintiff, at an expense of over $100,000; that its construction was of the Holley system, of the most approved and best style and character; that over thirteen miles of mains and pipe were laid through the streets of said village, hydrants to the number of 100 have been put in, and several hundred services for family and domestic use have been placed, the number of such services now amounting to about 700; that down to the commencing of the publication of said libels, or about then, the plaintiff had about 700 domestic services placed and in use; that the population of the village was about 13,000 inhabitants; that the plaintiff constructed a reservoir, which holds about 550,000 gallons of water, and sunk twenty-six artesian wells from which a large amount of water was obtained; that the water obtained from said wells was and always has been of good, pure quality, suitable for domestic purposes, except during some fires that have occurred, the quantity has been greatly reduced for a short time, and at such time it would be some roily; that at some time prior to the sixth day of February, 1886, the said defendants commenced their publication of libelous matter against the plaintiff and have continued the same, from time to time, down to nearly the present; and that the plaintiff has suffered in damages by reason of such publications being circulated among its patrons and the citizens generally of said village and city; that customers have been induced to cease using water furnished by plaintiff and others been prevented from taking water and becoming its patrons, by reason of such publication, and the plaintiff's reputation for furnishing good water for family purposes very seriously injured, greatly to the damage of the plaintiff; and through and by reason of such publications the plaintiff's name and repu-

tation for performing its agreements and furnishing pure water and suitable for domestic use, has been brought into disrepute, greatly to its damage and detriment in business.

Deponent further says that before the commencement of such publications the said water was analyzed by expert chemists, whose affidavits plaintiff cannot now obtain, of superior qualifications, who pronounced it of superior quality and suitable and proper for domestic purposes, and which statements and examinations were made public and brought to the knowledge of the defendants before the publication of several of the libelous statements set forth in said complaint; but, regardless of such analysis and examination, and with full knowledge thereof, the defendants continued to so publish said libels and wrongs and persisted in holding up the plaintiff, its officers and managers, as violators of the criminal laws of the State, in furnishing water that is poisonous, full of dead fish and filth, and wholly unfit for family or domestic use, and dangerous to be taken into the system, and deponent believes the fact to be that said publications were made for the purpose of inducing the said plaintiff to buy the good will of the said defendants by paying them money, thus stopping such libelous circulations among the people.

The said allegations, as to the poisonous and dangerous qualities of said water, were wholly untrue.

That the allegations and statements in said complaint are substantially true. That no previous application has been made in said action for an order. That said above entitled action has been commenced by the issuing of the summons and complaint therein for service upon said defendants.

A. FLYNN KENT.

Sworn to before me, this 13th day of August, 1886.

H. J. YATES,
Police Justice, City of Jamestown.

STATE OF NEW YORK,
CITY OF JAMESTOWN, CHAUTAUQUA COUNTY, } *ss.:*

AARON WILBUR, being duly sworn, says: As is stated in the foregoing affidavit of Ben. S. Dean, I was, on or about August 14, 1886, employed by him to collect evidence for use on the trial of the action in said affidavit mentioned. Afterwards, and while in the employment of said Dean, and about the last week in August, I was employed by the water committee of the common council of the said city to collect evidence and information on behalf of the city in its complaint against the Jamestown Water Supply Company. I have spent a great deal of time in that employment and

collected a great deal of evidence and information. I have been unable, through an inquiry extending over a period of over four months, to find a water consumer who uses the city water for drinking purposes without either boiling or filtering, or both. Many buildings in this city have several separate water services, and the 600 water services claimed by the water company does not represent 600 separate buildings. The larger portion of the services are in flats and blocks and stores, and many services are in barns, and for lawns, while many more are in factories. I think I am perfectly safe in saying that there are not 100 services to dwelling-houses in the city for drinking and cooking purposes.

On the 13th day of December, 1886, I drew a two-quart fruit-jar of water from the plank and timber conduit well, described in affidavit of Emil Kuichling (this book page 276). This jar has not been opened since its contents were drawn; it is marked "Exhibit 4, A. W." I was present when this well was opened, on December 7, 1886, as described by Mr. Kuichling (this book page 276). When I opened the conduit the same smell described by Mr. Kuichling was much stronger. It was so offensive that I had to step back and let the gas escape before I could get my sample.

On December 18, 1886, I drew a two-quart fruit-jar of water from one of the principal mains of the city, West Third street, not a "dead-end." This jar is marked "Exhibit 5, A. W.," and has not been opened since it was drawn.

On December 18, 1886, I drew a similar jar of water from the "dead-end" of the Lake View avenue main. This jar is marked "Exhibit 6, A. W.," and has not been opened since drawn.

All three of these jars were drawn at the request of the secretary of the State Board of Health, and the contents of all three are just as they came from the pipes. Lake View avenue, I understand, is the highest point in the city served by the water company.

Exhibit 9, hereto annexed, is a substantially correct map of the city of Jamestown.

The manufacturing establishments represented by the foregoing affidavits of A. P. Shearman, William A. Blackstone, William S. Gifford, William H. Boyd, Elial F. Carpenter, E. Wilkins, Charles Ipsan, W. J. Maddox, G. Walter Barnes, John Cadwell, Charles E. Parks, S. Winsor Baker, William L. Butts, Charles M. Wait, John T. Wilson, M. George Martyn, William N. Gokey, include all the manufacturing establishments in said city employing twenty hands or more, except the woolen mill of Allen Preston & Company, the worsted mills of William Broadhead & Sons, and the lumber mill of L. B. Warner. Mr. Preston of Allen, Preston & Company, declined to make an affidavit, but stated that the water furnished by the water supply company was not used in his mill for any purpose. The city water is not used at Mr. Warner's mill. I understand that either William Broadhead or one of his sons are

stockholders in the Jamestown Water Supply Company, and I am informed that the employes at his mill, and they number between 400 and 500, to some extent use the city water, but that a portion of their water supply, how much I do not know, is obtained from a spring in the factory and from a neighboring well.

Neither Shearman Bros., the Jamestown Cane Seat Chair Company, nor the Columbia Grain Drill Company have any city water connection. E. F. Carpenter & Company and John T. Wilson each have private city water hydrants near their buildings and Mr. Wilson has the water in his mill office. Except Martyn Bros. and Gokey & Son, who speak for themselves, all the other of said factories have the water in their buildings accessible to their employes if they wanted to use it.

The water company during the fore part of this week for several days have been flushing their mains. I saw water as it came from the hydrant and it was very yellow. After this flushing had been going on for several days I began to hear that J. P. Pennock and C. J. Jenner, in company with one of the officers of the water company, were about tasting the water and collecting samples. The rumor is on the streets, but the truth of it being known only to the water company it is incapable of verification, that after this flushing the company so handled its water that only driven well water, stored for the occasion, was all there was in the pipes after the first day or two of this week. From the sudden and favorable change in the water I believe this rumor true.

I took said dead-end sample, Exhibit 6, about four o'clock in the afternoon; the water was running when I got there, and I was informed by persons who claimed to know, that it had been running all day.

"Exhibit 10, A. W.," is a sample of water taken through the ice adjacent the crib in the lake December 18, 1886.

AARON WILBUR.

Subscribed and sworn to before me, December 18, 1886.

MARVIN SMITH,
S. C. Judge.

We refer to the articles of incorporation of the Jamestown Water Supply Company on file in the office of the Secretary of State as a part of this testimony.

(Here follows a copy of Emil Kuichling's first report.)

This report is verified by the affidavit of Mr. Kuichling. (See pages 271-2.)

PROPOSITIONS AND REQUESTS.

This proceeding finds its authority in section 8, chapter 322 of laws of this State conferring authority upon the Governor to declare certain things, upon the confirmation by him of a report of the State Board of Health, to be public nuisances, "and order them to be changed as he shall direct, or abated and removed." Further authority may be found in the act for the preservation of public health and registration of vital statistics (Laws of 1885, chap. 270), and the power is extended to include all water supply companies by the act conferring upon the State Board of Health power to protect from contamination, by suitable regulations, the water supplies of the State and their sources. (Laws of 1885, chap. 920.)

The city of Jamestown asks that the powers of the Governor and the State Board of Health be exerted in its favor and against the Jamestown Water Supply Company, a corporation duly incorporated under the laws of this State providing for the incorporation of companies to furnish cities with an abundant supply of pure and wholesome water, and that this company be compelled to do and perform certain things and commanded from the doing of certain other things, to the end that the contract and compact it entered into by the acceptance of its franchise may not in the future as it has been in the past, constantly violated and broken.

The city of Jamestown and the inhabitants thereof ask:

1. That the eclectic conduit connecting the foot of Chautauqua lake with the water system and mains of the water company be condemned, as unsafe to public health and a menace thereto, and as insufficient in capacity to furnish the abundance of water the compact of the company with the State contemolates, reouires and demands.

2. That the water of the outlet of Chautauqua lake be condemned as a source of water supply to the city of Jamestown; and that the water company be absolutely restrained and prohibited, forever, from taking, using or furnishing any water from said outlet, and that its connection therewith be permanently severed and broken.

3. That the present crib of the water company situated in the shallows of the foot of Chautauqua Lake be condemned as a nuisance and menace to public health, and as such required to be abated and removed.

4. That the water company be forever restrained and prohibited from using the shallows at the foot of Chautauqua lake as a source of water supply to the city of Jamestown and the inhabitants thereof.

5. That the water company be forever restrained and prohibited from using any water taken from the said Chautauqua lake as a water supply to the city of Jamestown or the inhabitants thereof, unless the same be filtered, by means of a system of filtration approved by the State Board of Health, immediately before use at its pumping station.

6. That the water company be forever restrained and prohibited from using the water of Chautauqua lake as the base of a water supply except such supply be taken through a conduit approved as to construction, material and capacity by the State Board of Health.

FIRST. A description of the conduit will be found in Mr. Kuichling's report, together with his opinion thereon. (Pages 237-239.) He makes a correction as to his report in his affidavit (page 271) and to his supplemental report. Mr. Kuichling also gives his opinion of the conduit at page 277.

The fact that this conduit leaks is shown by a comparison of the samples of water accompanying this testimony. There is no hypothesis that will explain the presence of swamp muck, and decayed ferns in the water but that the conduit leaks. Nor is there other explanation of the presence of sulphuretted hydrogen at the wooden well as described by Kuichling and Wilbur. It will be noticed that Mr. Kuichling says that the water taken from the lake adjacent the crib was better than water taken the same day at the end of the wooden conduit from the miserable excuse for a well, described by him as a vertical extension of the conduit.

The capacity of the conduit as a fire protection is condemned by Mr. Kuichling in his supplemental report. His figures also show that the present conduit is insufficient in capacity for a city of 17,000. The company now claim only 600 takers, and yet say they pump daily 1,000,000 gallons. If the water was taken as it should be, if an acceptable supply, the quantity pumped would be much more. There are 3,000 dwellings in Jamestown and 601 business places (page 274) and the 600 claimed by the company does not include 100 dwellings.

SECOND. There can be no question but that the outlet water is absolutely unsafe as a domestic supply. No more can there be question but that permitting this water company, at least under its present management, to have a connection with the outlet is a constant temptation to it to use the water taken therefrom and a constant menace to public health. (See the affidavits of Dr. W. M. Bemus, John Conway, Ezra Hibbard and Ben. S. Dean.) The testimony justifies the remark made by a member of the committee at the meeting of December seventh, that the public had lost confidence in the integrity of the company.

THIRD. The crib at the foot of Chautauqua lake is fully described by Mr. Kuichling in his report, and the testimony shows it a failure and frivolous thing. A make-shift that permits the company to talk largely of its "crib," as it does largely of its equally frivolous conduit.

The bottom and character of the lower half of the lake are fully described by Mr. Kuichling, and in the affidavits of Theodore E. Grandin and Dr. George W. Whitney.

FOURTH. This request and proposition is involved in the third.

FIFTH. This proposition is justified by the whole evidence. It meets the approval not alone of Mr. Kuichling and the authors and authorities by him in his report and affidavit quoted, but the approval of Dr. Alfred Leeds, chemist to the water company. (See his Albany report; Kuichling's affidavit, pp. 271-276.) Dr. Leeds seems to think, so one would derive from his antagonistic reports, that the citizens of Jamestown do not require as good water as do the citizens of Albany.

SIXTH. This proposition is involved in the first.

We ask that filters, cribs and conduits be subject to the approval of the State Board of Health. The evidence shows the incapacity of the company to construct a conduit or a crib or a system of filters; furthermore, the people, having lost confidence in the integrity of the company, would distrust its plans, or if plans were made public they would feel little confidence, even if promised of execution, that they would be executed with integrity.

CONCLUSION.

We wish to call attention to the affidavits of the manufacturing establishments (including all but three employing over twenty hands) showing, although nearly all have a water connection, yet 1,500 employes do not use the city water. The reason is obvious. The company say in September that they have but 600 takers, and Mr. Kent swears in August it had 700. (Pp. 273 and 296.) The annexed pamphlet was distributed about August 14th and the libel suit of the company was commenced the same day. These facts show which were believed, the pamphlet or the newspapers. If the former, why did the takers fall off 100 in a month. (Dean, pages 294-295.)

It must not be lost sight of that the city in collecting evidence, especially at this time of the year, are somewhat under a disadvantage The company could easily store in its reservoir a supply of driven well water, flush their mains and turn in the well water and then take samples. The rumor is that this they did, and from the sudden change in the water it looks as if it were so. Notice the dates of these affidavits from day to day stating the quality of the water, then look at any samples taken after say the fourteenth of December. (See Wilbur's affidavit page 297). We believe that an analysis of water drawn from mains after that date compared with the analysis published in Kuichlings report and the pamphlet will demonstrate that the water was spring water stored and used for the occasion.

It is understood that the water company will claim that their papers show for some years before the establishment of its system, Jamestown was a great sufferer from zymotic diseases. If their papers show this, it is only inferentially. It is not so.

The company will also claim that the good health of Jamestown and its comparative freedom from zymotic diseases is due to its

water. This cannot be so. The population, number of dwelling houses and business places compared with the very few consumers disproves the statement and claim, saying nothing of the fact that those who do use the water for a drink either filter or boil it or both (page 298) before using. Even if this use was universal, it would not or should not relieve the company from filtration. Besides, Dr. George W. Whitney says he has found the origin of low types of fever in the city water and from drinking the water of melted ice taken from the lower end of the lake. The evidence of one physician who does trace disease to the water is stronger than the evidence of a hundred who say they have not and do not say they have tried. Such negative testimony is on a par with the defense of the man who stole a calf. One man swore he saw him steal it; he produced ten men who swore they did not see him steal it and asked an acquittal, which he did not get.

The water company should also be required to remedy the trouble produced by the "dead-ends" of their mains. Some plan should be devised that would establish circulation and the company compelled to carry out the plan.

"F."

AFFIDAVITS SUBMITTED BY THE WATER COMPANY.

IN THE MATTER
OF THE
APPLICATION OF THE COMMON COUNCIL OF THE CITY OF JAMESTOWN, N. Y., FOR EXAMINATION OF THE WATER AS SUPPLIED BY THE JAMESTOWN WATER SUPPLY COMPANY TO SAID CITY AND ITS INHABITANTS.

CHAUTAUQUA COUNTY, *ss.:*

A. FLYNN KENT, being duly sworn, says that he resides in said city and is president of said company; that he has been connected with said company during its entire existence and had full knowledge of its works and sources of supply; that the water, at present supplied by said company to said city, comes from Chautauqua lake and certain artesian wells located along and near the works of said company; that the crib in the lake is about 10,200 feet from said water-works; that the conduit, through which the water flows from the lake, for the first 5,000 feet from the lake, is twenty-four inch spiral riveted wrought iron pipe and in good condition; that the next 2,600 feet is a wooden conduit, or flume, constructed as shown by affidavit and diagram of Adam

Ports, in this matter used; that the balance of the distance to the works, about 2,600 feet, is ten-inch wrought iron pipe, to be replaced by a wooden flume or conduit, the same as section already laid, to a point where the water enters the pumping well of said company; that the same is as seen by the board of health, or certain members thereof, on the seventh instant; that said conduit is in size twenty-two by thirty-one inches, inside measurement; and runs a continual stream, which, together with the water produced by said wells, affords an ample supply; that these two sources of supply have been thus used only from about the 17th day of September, 1886; that cold weather, with attendant difficulties, came on too soon for an entire completion of said wooden conduit this last fall, which is to be completed to said works as soon as possible next year; that the pipe connecting the outlet with the said works of said company at the boat-landing, is not to be used, except in case of fires of great danger to said city; and, when the said wooden conduit is completed, in the judgment of deponent, it will not be necessary to use it even for that purpose, as ample supply will then be afforded through said conduit and from said wells. The suggestion of use of said outlet pipe is simply a matter of precaution in which the public is greatly interested; but deponent further says that said company has been for several months and yet is ready and willing to disconnect such pipe or supply, at any time said common council will consent thereto or direct; that said outlet connection was made with knowledge, approval and consent of the members of the old board of trustees of the village of Jamestown; and the said company does not regard the circumstances such as to warrant its removal without the consent or direction of said common council; that this position has been known to the members of said council for many weeks; and was so announced before the representatives of said board of health, in Jamestown, N. Y., on the seventh instant; and the said company is yet ready and willing to abide by such obligation.

Deponent further says that on the 11th day of November, 1881, he and certain other persons, then proposing to form the present water-supply company, and in anticipation thereof and of furnishing water to the then village of Jamestown and its inhabitants, in an application made to the then board of trustees of said village, stating as follows:

"Th sources from which water is to be supplied are Chautauqua lake, or the outlet thereof, and wells to be sunk near the margin thereof and in or near to said village."

As appears from the records of the proceedings of said board, on said eleventh day of November, the said proposition was approved in the following form:

"On motion the above application was granted.

"E. W. BUCKLIN, JR.,
"*Village Clerk.*"

Deponent further says that the distribution of water pipes and hydrants around said city, as mapped out on the map and plans of said works, were known to and approved of by the said board of trustees, and from that time down to the present the said several boards of trustees and said common council have had full knowledge of the same.

Deponent further says that there are about fourteen miles of pipe, exclusive of said conduit, within said city; that much of the same extends upon quite high hills and down into the lower places or flats of said city; that there are about twenty of dead ends to said piping, so that there is no complete circle of said water; that these dead ends are scattered around in said city, many of them upon the side hills thereof; that such plan of construction was made upon the judgment of experienced engineers, and to the knowledge and by the approval of said trustees; that the form and plan of such construction was supposed to be a safer and better fire protection; that the whole was supposed and intended to be the safest and best for said village; that at the time of submission of said plans to said village authority the said company objected to said dead ends, claiming they would cause dead and bad water; but said trustees insisted upon the construction as aforesaid, and the same was accordingly adopted.

Deponent further says said conduit is constructed with good and substantial lumber, and made in a strong, tight and durable form so as to exclude all water from outside getting in.

Deponent further says that much of the complaint made against said water has been occasioned by the negligence of water takers, in not properly flushing their services before taking water for domestic use; that the difficulty heretofore existing on account of certain vegetable growth has been greatly overcome and is constantly being improved under the suggestions of said Dr. Leeds.

That no complaint has been made to said company that such supply had caused illness or was dangerous to public health; nor has deponent had any knowledge of any illness which has been attributed to the use of said water.

Deponent further says that arrangements have been made with an eminent chemist for periodical examinations of such supply, as often as shall be necessary and proper to keep track of such water and its condition.

A. F. KENT.

Sworn before me this 18th day of December 1886.

D. D. WOODFORD,
Justice of the Peace.

STATE OF NEW YORK, } ss.:
CHAUTAUQUA COUNTY, }

A. Flynn Kent, being duly sworn, says, he is president of the Jamestown Water Supply Company; that the report hereto attached, as sworn to by Albert R. Leeds, is a true copy of report made to said company and of the whole thereof.

A. F. KENT.

Sworn before me this 17th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

(The reports of Prof. Leeds, Prof. Kent and Prof. Willis G. Tucker, each of which is sworn to, here follow).

STATE OF NEW YORK, } ss.:
CHAUTAUQUA COUNTY, }

Dr. A. F. Ward, being duly sworn, says that he is a practicing physician in the city of Jamestown, and has been for at least twenty-five years last passed.

Since the establishment of said water supply he has had cognizance of the same and of the water supplied; that, compared with the like number of years just prior to the commencement of such supply (and notwithstanding a very large increase in population), in his judgment and experience there has been a considerable less number of cases of sickness and deaths from zymotic diseases and such diseases as would naturally be occasioned by the use of bad and unwholesome water, and in the best judgment and belief of deponent, the use of said water as supplied by said company during its entire existence has not endangered the security of life or the health in said locality where it has been so used. Nor does the water now supplied by said company, in the judgment of deponent, affect the security of life and the health in said locality. Deponent further says that he is using the water in his own family for domestic purposes and has been since July 1, 1883, and that he considers it preferable and far safer to use than the water of most of the private wells of this city.

A. F. WARD, M. D.

Sworn before me, this 14th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

STATE OF NEW YORK, } ss.:
CHAUTAUQUA COUNTY, }

Dr. F. D. ORMES, being duly sworn, says that he is a practicing physician in the city of Jamestown, and has been for the period of twenty years last past.

Since the establishment of the present water supply he has had cognizance of the same and of the water supplied; that, compared with the like number of years just prior to the commencement of such supply (and notwithstanding a very large increase in population), in his judgment and experience there has been a considerable less number of cases of sickness and deaths from zymotic diseases and such diseases as would naturally be occasioned by the use of bad and unwholesome water; and in the best judgment and belief of deponent, the use of said water as supplied by said company during its entire existence has not endangered the security of life or the health in said locality where it has been so used; nor does the water now supplied by said company, in the judgment of deponent, affect the security of life and the health of said locality. Deponent further says, that since November 15, 1883, he has used the said water, supplied by the Jamestown Water Supply Company, in his own family for domestic purposes, and that with the exception of a slightly woody taste that has occasionally been noticeable for a short time, he has found the water during this period entirely satisfactory and to all appearances pure and wholesome; and the water at the present time is exceptionally good and perfectly satisfactory.

F. D. ORMES, M. D.

Sworn to before me, this 14th }
day of December, 1886. }

EDWARD MORGAN,
Notary Public.

STATE OF NEW YORK, } ss.:
CHAUTAUQUA COUNTY, }

Dr. J. W. SCOTT, being duly sworn, says that he is a practicing physician in the city of Jamestown, and has been for the last eighteen years. Since the establishment of said water supply, he has had cognizance of the same and of the water supplied; that, as compared with the like number of years just prior to the commencement of such supply, in his judgment and experience, there has been a considerable less number of cases of sickness and deaths from zymotic diseases, and such diseases as would naturally be occasioned by the use of bad and unwholesome water, and in the best judgment and belief of deponent, the use of said water, as supplied by said company during its entire existence, has not endangered the security of life or the health in said locality where it has been so used; nor does the water now supplied by said com-

pany, in the judgment of deponent, affect the security of life and health of said locality. Deponent further says, that since September 1, 1882, he has used the said water, supplied by the Jamestown Water Supply Company, for domestic purposes, and that with the exception of a slight woody taste that has occasionally been noticeable for a short time, he has found the water during this period entirely satisfactory and to all appearances pure and wholesome; and the water at the present time is exceptionally good and perfectly satisfactory.

JOHN W. SCOTT, M. D.

Sworn to before me, this 15th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

STATE OF NEW YORK, Chautauqua County, } *ss.:*

Dr. W. P. BEMUS, being duly sworn, says that he is a practicing physician in the city of Jamestown, and has been for the last thirty-three years. Since the establishment of said water supply he has had cognizance of the same, and of the water supplied; that compared with the like number of years just prior to the commencement of such supply, in his judgment and experience, there has been a considerable less number of cases of sickness and deaths from zymotic diseases and such diseases as would naturally be occasioned by the use of bad and unwholesome water, and, in the best judgment and belief of deponent, the use of said water as supplied by said company, during its entire existence, has not endangered the security of life or the health in said locality where it has been so used; nor does the water now supplied by said company, in the judgment of deponent, affect the security of life and the health of said locality.

W. P. BEMUS.

Sworn to before me, this 18th day of December, 1886,

D. D. WOODFORD,
Justice of the Peace.

STATE OF NEW YORK, Chautauqua County, } *ss.:*

Dr. W. M. BEMUS, being duly sworn, says he is a practicing physician in the city of Jamestown, and has been for the period of nine years past, and was the health physician of the local board of health from May, 1881, to May, 1886. Since the establishment of the present water supply he has had cognizance of the same and of the water supplied by the Jamestown Water Supply Com-

pany; that compared with the like number of years just prior to the commencement of such supply (and notwithstanding a very large increase in population), in his judgment and experience, there has been a considerable less number of cases of sickness and deaths from zymotic diseases and such diseases as would naturally be occasioned by the use of bad and unwholesome water; and in the best judgment and belief of deponent, the use of said water as supplied by said company, during its entire existence, has not endangered the security of life or the health in said locality where it has been so used; nor does the water now supplied by said company, in the judgment of deponent, affect the security of life and the health in said locality.

WM. MARVIN BEMUS.

Sworn to before me, this 17th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

WILLIAM C. J. HALL, being duly sworn, says that he is of the age of fifty-eight years, a graduate of Yale College of class of '51, a chemical student of Prof. Bunsen, of Heidelberg, Germany, and served a while as civil engineer on the Atlantic and Great Western Railroad; that he has made the study of the microscope a specialty for twenty-two years, and is now Professor of Microscopy in the Chautauqua University; that during the past four years he has, from time to time, made examinations of the water supplied by the said water company, in the city and old village of Jamestown; that such examinations have been by chemical and biological analyses, and were thorough, for the purpose of ascertaining the quality of the water being furnished; that from such examinations deponent has never found anything dangerous or detrimentral to the health of the people; that deponent at times found the water tasting disagreeably and searched for the cause, and from such investigations he found it to arise from decayed fresh water algæ or sea weed; that this discovery was made by deponent prior to the connection with the outlet, and this algæ or sea weed must have been intro- from the artesian wells, as no other water was then being used, and must have been generated after leaving the pump, as deponent never tasted anything bad at the works, although he visited them and tasted of the water quite often for a long time; that this algæ would decay in the pipes, which caused the bad taste and smell, but which would disappear after flushing of the pipes; that since such discovery and the application of remedies, the water has continued to be relieved of this difficulty; that, in deponent's judgment, most of this difficulty has arisen because of said "dead-ends," in prevent-

ing a circulation of the water, and the trouble may be overcome by frequent flushing.

Deponent further says that he was one of the citizens' committee appointed to represent them as to the introduction of water into the said village; that he knows the construction of the pipes, location of dead-ends and hydrants were in obedience to the requirements of the then board of trustees of said village, and contrary to the wishes of the said water company.

Deponent further says that since such first examination he has kept close observation of such water, especially as to its effect upon public health; that during all this time he had not known or heard of any disease, illness or death that has been claimed to have been caused by the use of said water, nor has he known or heard of any detrimental effects from such use; that during such time deponent has very frequently used of said water and found it to be good, except as hereinbefore stated.

Deponent further says that since the discovery of said difficulty the said water company has been very diligent in its efforts to overcome the same and is gradually doing so.

Deponent further says that he has been in the habit of drinking and using water from Chautauqua lake and has frequently drank of the water taken from said crib since the use thereof by said company, and that such water is good, wholesome and potable, and deponent believes it was a wise conclusion of said company in making such connection with said conduit for the purpose of supplying said city.

W. C. J. HALL.

Sworn before me this 18th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

Dr. G. W. HAZELTINE, being duly sworn, says he commenced the practice of medicine in the village of Jamestown forty-eight years ago; has practiced here ever since, except that in the last few years has practiced but little, but has been a close observer of the healthfulness or unhealthfulness of the place, and especially with reference to zymotic diseases.

Since the establishment of the present water supply he has had cognizance of the same and of the water supplied. That compared with the like number of years just prior to the commencement of such supply, in his judgment and experience, there has been a considerable less number of cases of sickness and death from zymotic diseases, and such diseases as would naturally be occasioned by the use of bad and unwholesome water and, in the best judgment and belief of deponent, the use of said water, as supplied by said company

during its entire existence has not endangered the security of life or the health in said locality where it has been so used. Nor does the water now supplied by said company, in the judgment of deponent, affect the security of life and the health in said locality.

Deponent also says that he resides at No. 416 Lafayette street, in the city of Jamestown, and has resided at this locality for at least twenty-five years last past, and that he has used the water supplied by the Jamestown Water Supply Company since August 1, 1882, in his family for domestic purposes, and have found the water during that time of a satisfactory quality and to all appearances pure and wholesome. There have been times in the above period when there has been a slight woody taste for a day or two, but not to such an extent as to prevent its use for domestic purposes.

Deponent further says that at the present time, and since the introduction of the lake water as a part of the supply, the water has been of excellent quality and perfectly satisfactory, and in his judgment pure and wholesome.

G. W. HAZELTINE, M. D

Sworn to before me, this 17th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

ADAM PORTS, being duly sworn, says he resides at No. 301 East Eighth street, in the city of Jamestown, and has resided in said locality at least nineteen years last past; that he is one of the aldermen of said city; that he is a carpenter and builder by trade; that he had the entire supervision of the building of the wooden flume or conduit which forms a part of the lake line of the Jamestown Water Supply Company. Said conduit is built entirely of Norway pine in a manner approved and recommended by him and shown in diagram hereto attached. The spiles are six inches by six inches square, and from twenty to twenty-eight feet in length, according to the depth of the peaty soil, extending through said peaty soil into solid ground underneath. These spiles are driven in two rows, three feet apart, forming a substantial support for the flume. The bottom, top and sides of said flume are also of Norway pine, two inches thick, matched and grooved, as shown in accompanying diagram, and put together in the most thorough and substantial manner, and deponent believes is substantially water-tight and will exclude surface water or other thing from getting through, and will remain in such tight condition, and will stand any strain that it is likely to be subjected to, and will last as good, as at the present time, for many years. The inside measurement of said conduit is twenty-two inches by thirty-one inches, and the length is about 2,600 feet, and in deponent's judgment it will be a permanent, substantial and safe

structure fully competent for the conducting of all needed water, free from leakage and all contamination by or from waters on the outside thereof.

ADAM PORTS.

Sworn to before me, this 15th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

R. J. FORBES, being duly sworn, says he is street commissioner of the city of Jamestown, and has been, since the organization of the city government, that he resides at the corner of Main and West Sixth streets, and has resided at this locality for at least twenty-four years last past, and that he has used the water supplied by the Jamestown Water Supply Company since August 15, 1883; has found the water during that time of a satisfactory quality, and to all appearances pure and wholesome. There have been a few times in the above period when a slight woody taste has been noticeable, but not to such an extent as to prevent its use for domestic purposes; deponent also says that at the present time the water is of excellent quality and perfectly satisfactory.

Deponent further says that during the time that he has used said water there has been no cases of sickness or death in his family from zymotic diseases or such diseases as he would naturally suppose to be caused by bad and unwholesome water.

R. J. FORBES.

Sworn to before me this 18th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

STATE OF NEW YORK, CHAUTAUQUA COUNTY, *ss.:*

A. N. BROADHEAD and F. E. GIFFORD, each for himself, being duly sworn, says he was a member of the board of trustees of the village of Jamestown at the time the outlet connection was made by the Jamestown Water Supply Company. That said connection was put in as an additional safeguard against fire, and he approved and advised the putting in of the same for that purpose.

A. N. BROADHEAD.
FRANK E. GIFFORD.

Subscribed and sworn to before me, December 16, 1886.

JEROME B. FISHER,
Notary Public.

STUDY OF FIRST PRESBYTERIAN CHURCH,
December 17, 1886.

CHAUTAUQUA COUNTY, *ss.:*

Rev. N. I. RUBINKAM, being duly sworn, says that he is the pastor of the First Presbyterian Church, in the city of Jamestown, and resides at No. 313 West Third street, in said city, and has resided in this locality for one year—and that during that time has used the water supplied by the Jamestown Water Supply Company in his family for domestic purposes without any effects detrimental to health.

Deponent says that there has been a woody taste noticeable, and that there was, for a period, a discoloration, but that at the present date the water is of excellent quality, and, to all appearances, wholesome.

NATH'L I. RUBINKAM.

Sworn to before me this 17th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

FRANK B. FARNHAM, being duly sworn, says: he resides at No. 402 East Fourth street, city of Jamestown. Have used the water supplied by the Jamestown Water Supply Company in my family for all domestic purposes the past year; have found the water during that time to be of a satisfactory quality and to all appearances pure and wholesome. During the above time there has been occasionally a slight woody taste for a day or two at a time, but not to such an extent as to prevent its constant use for domestic uses, deponent further says that at the present time and since the introduction of the lake water as a part of the supply the water has been exceptionally good and perfectly satisfactory.

FRANK B. FARNHAM.

Sworn and subscribed before me this 14th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

M. M. BROOKS, being duly sworn, says: I reside at No. 332 East Third street, city of Jamestown. Am civil engineer by profession. Have charge of the business of the Pennsylvania Gas Company in this city. Have used the water supplied by the Jamestown Water Supply Company for domestic uses in my family, since March 24, 1886. Have found the water during that time to be of a satisfac-

tory quality and to all appearances pure and wholesome. During the above time there has been occasionally a slight woody taste, for a day or two at a time, but not to such an extent as to prevent its use for domestic purposes. He further says that at the present time, and since the introduction of the lake water as a part of the supply, the water has been exceptionally good and perfectly satisfactory.

M. M. BROOKS.

Sworn before me this 14th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

SOLOMON JONES, being duly sworn, says he resides near the eastern limit of the city of Jamestown, at the extremity of the water main in that direction and about one and one-half miles from the water works. That the main from which his supply is taken is a single line, extending fully one-half mile beyond any intersecting main, and there are but few other water-takers on said line. That deponent has been using water from such supply, for domestic use, for three years and with the exception of an occasional woody taste the water has been uniformly good and wholesome, in every way satisfactory. That when such woody taste appeared he would notify said company and some one would come and flush the main, after which the water would be all right. That the water, as now furnished by said company, is excellent and in all respects satisfactory.

Deponent further says that he has resided in said locality for the last thirty years and had knowledge of the general illness and sickness in said city and the old village of Jamestown, such as would be derived from general report and newspaper information. And that, from his knowledge and in his judgment, during the past four years, as compared with the same number of years before, there has been no increase of disease or deaths, and, taking into account the increase of population, deponent verily believes the proportional illness during the four years last past has been less. That from his judgment and knowledge it has been, during such time, remarkably healthy in said place. That deponent has not known or heard of any deaths or disease claimed to have been occasioned from the use of said water, and in his judgment the use thereof has not been, nor is it now, detrimental to the health of the people in said locality or city, and that the same is not endangered by such use.

SOLOMON JONES.

Sworn before me this 14th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

ROBERT T. HAZZARD, being duly sworn, says he resides at No. 525 East Second street, in the City of Jamestown, and has resided at this locality for at least ten years last past, and has used the water as supplied by the Jamestown Water Supply Company constantly for all domestic uses in my family since August 1, 1882, and have found the water during that time of a satisfactory quality and, to all appearances, pure and wholesome. There have been a few times in the above period when a slight woody taste has been noticeable for a day or two, but not to such an extent as to prevent its constant use for domestic purposes, such taste always disappearing when the mains were flushed; deponent also says that at the present time the water as now supplied is of excellent quality and entirely satisfactory.

Deponent further states that he is one of the proprietors of the Parks & Hazzard shoe factory, located in the city of Jamestown, and that during the period since the introduction of said water supply to his house, August 1, 1882, he has had no cases of sickness or death in his family from zymotic diseases or such diseases as would naturally be occasioned by the use of bad and unwholesome water.

R. T. HAZZARD.

Sworn before me, this 15th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHANTAUQUA COUNTY, *ss.:*

FRANK S. JONES, being duly sworn, says he resides at 221 East Eighth street, city of Jamestown, has resided in said locality for at least five years. Have used the water supplied by the Jamestown Water Supply Company constantly for all family uses since July 28, 1883; have found the water during that time of a satisfactory quality and, to all appearances, pure and wholesome. There have been a few times in the above period when a slight woody taste would be noticeable for a day or two, but not to such an extent as to prevent its use for domestic purposes. He also says that during the above period there has been no sickness or death from zymotic diseases in his family.

He further says that at the present time and since the introduction of the lake water, the water has been exceptionably good and perfectly satisfactory.

FRANCIS S. JONES.

Sworn before me, this 14th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

WILLIAM H. KEELER, being duly sworn, says he resides at No. 17 Fulton street, in the city of Jamestown, has resided at this locality at least four years last past, and has used the water as supplied by the Jamestown Water Supply Company constantly for domestic uses in his family since December 1, 1882, and has found the water during that time of a satisfactory quality and, to all appearances, pure and wholesome. There have been occasional appearances of a slight woody taste for a day or two, but not to such an extent as to prevent its constant use for domestic purposes, this taste referred to always disappearing after the mains were flushed; deponent also says that at the present time and since the introduction of the lake water as a part of the supply, the water has been excellent and perfectly satisfactory. Deponent further says that he is one of the firm of W. H. Keeler & Co., "City Book Store;" that there has been no case of sickness or death in his family from zymotic disease, or such diseases as would naturally be occasioned by bad and unwholesome water, during the time that he has used the water furnished by the Jamestown Water Supply Company.

W. H. KEELER.

Sworn to before me, this 15th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

C. R. LOCKWOOD, being duly sworn, says that the within attached are true copies of correspondence had by and between deponent, for and on behalf of said Jamestown Water Supply Company and the chairman of the committee appointed by the common council of said city; that said letter, signed by deponent, was handed to the said committee, by leaving the same at the office of said Booty, December 10, 1886, and the answer, of which a copy is hereto attached, was received by deponent, December 10, 1886, in the evening of that day. Deponent further says that he has been, and yet is, acting in behalf of said water company, and made the said request and suggestion for the purpose of expediting said investigation, by enabling each party to fairly and properly meet the evidence filed by the other; but that said water company, by said refusal, has been unable to meet the testimony of said committee, very much to its prejudice, as deponent verily believes; that there was no agreement made or direction given that the said parties should not be permitted to examine the affidavits by them filed, respectively.

C. R. LOCKWOOD.

Sworn to before me, this 17th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

Law Offices of
Lockwood, Lockwood & Shaw.

C. R. Lockwood,
Lee J. Lockwood,
Robert G. Shaw.

Jamestown, N. Y., *December* 9, 1886.

To Hon. O. F. Price, *Mayor of the City of Jamestown, N. Y*; E. R. Booty, John G. Wicks and T. E. Grandin, *Aldermen of said City:*

Gentlemen.—Understanding that you are a committee, appointed by the common council of said city, to take charge of the controversy with the Jamestown Water Supply Company, now pending before the State Board of Health, the said company suggests that a better elucidation of said matter would be accomplished if the affidavits, to be drawn and submitted to the said Board by either of said parties, could be examined by the adverse party before submission and in time for counter or explanatory affidavits. I submit that the important questions in issue cannot be thoroughly or intelligently presented or considered without each party knowing something of the substance of the affidavits to be offered by the other.

With the view, therefore, of placing said parties on an equality in this respect, that fairness may prevail, the said company hereby offers to serve upon you, in such manner as you may suggest, copies of all its affidavits taken in this city and to be furnished under said proceeding, and most respectfully asks that you reciprocate as to such affidavits as you propose to present on the part of said counsel. Affidavits to be so served as rapidly as can be prepared and within one week from this date. Explanatory or counter-affidavits to be served before the day of submission, and as soon as possible after the service of the primary ones.

Should you acquiesce in the above, all affidavits to be served by you may be served on me at my office. Trusting the above suggestions will meet your approval, and most respectfully soliciting from you an answer as soon as convenient, I am pleased to remain,

Yours truly,
C. R. LOCKWOOD,
Attorney for said Company,
No. 7 Opera House Block, Jamestown, N. Y.

Jamestown, N. Y., *December* 10, 1886.

C. R. Lockwood, Esq.:

Dear Sir.—Your communication concerning the furnishing copies of affidavits to the adverse party, between the city and water supply company, before the State Board of Health, received, and in reply would say that after advising with each other the committee think it best to abide the agreement already made. By so doing there will be no misunderstanding. By adopting your suggestions

we cannot see anything to be gained by the company except delay, and an additional expense will be incurred by the city.

Most respectfully,

ED. R. BOOTY,

Chairman of Committee.

CHAUTAUQUA COUNTY, *ss.:*

W. L. BUTTS, being duly sworn, says that he works in the Jamestown Worsted Mills, William Hall & Co., proprietors; that on yesterday Marvin Smith and Aaron Wilbur came into said mills, where deponent was, and asked him what kind of water was used in the mills for drinking, and deponent told him spring water; then he asked how many hands were employed, and deponent told him about five hundred; then he asked if we used it for dyeing purposes, and deponent told him we did not, but had connection with the city water, to use it in case of accident to pump; this was all asked, as deponent remembers; that deponent signed his name in a book, but was not sworn. That at this time Mr. Briggs, one of the proprietors of the mill, was there, but no questions were asked him, and no opportunity offered for an explanation why city water was not used; that the reason why city water is not used there is because the mill has connection of itself with the outlet—not because of its unfitness; that drinking water is taken from a spring near by, and not necessary to use city water for drinking; that city water is not used, and not because of its badness, but because it is not needed; that from what deponent said in answering such questions he did not intend to have it understood or inferred that city water is bad, or that for that cause it was not used.

W. L. BUTTS.

Sworn to before me, this 18th day of December, 1886.

H. U. BAIN,

Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

C. F. HEDMAN, being duly sworn, says that he resides in the city of Jamestown, and has so resided for at least fourteen years last past; that he is at the present time one of the councilmen of said city; that he has used the water supplied by the Jamestown Water Supply Company for domestic uses since August 1, 1882; deponent also says that since the introduction of the lake water the water has been greatly improved as to quality, and in my judgment the water received at the hydrant at my place is pure and wholesome at the pr nt time.

C. F. HEDMAN.

Sworn to before me, his day of December, 1886.

D. D. WOODFORD,

Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

SIDNEY JONES, being duly sworn, says he is a merchant doing business in the city of Jamestown, and has been for at least twelve years last past, and that he resides at No. 333 East Fourth street, in said city, and has resided at this locality for at least twenty years last past, and has used the water supplied by the Jamestown Water Supply Company constantly for domestic uses in his family since November 11, 1882, and have found the water during that time of a satisfactory quality and to all appearances pure and wholesome. There have been times in the above period when there has been a slight woody taste noticeable for a day or two at a time, but not to such an extent as to prevent its use for domestic purposes; deponent also says that at the present time and since the introduction of the lake water as a part of the supply the water has been of excellent quality and entirely satisfactory, and in his judgment pure and wholesome. Deponent further says that since the introduction of said water supply to his house, November 11, 1882, there has been no cases of sickness or death in his family from zymotic diseases or such diseases as would naturally be occasioned by bad or unwholesome water, and in his judgment such diseases are much less prevalent here since the establishment of the present water supply than for a similar period just previous to said water supply being introduced.

SIDNEY JONES.

Sworn to before me, this 15th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

ALEXIS CRANE, being duly sworn, says he lives at No. 516 Jefferson street in the city of Jamestown, and has resided at this locality for at least three years last past, and have used the water supplied by the Jamestown Water Supply Company constantly for all domestic uses in my family since April 26, 1883, and have found the water during that time of a satisfactory quality and to all appearances pure and wholesome. There have been a few times in the above period when a slight woody taste has been noticeable for a day or two at a time, but not to such an extent as to prevent its constant use for domestic purposes; deponent also says that at the present time and since the introduction of the lake water as a part of the supply the water has been excellent and perfectly satisfactory.

Deponent also says that he is one of the firm of Hatch & Crane, druggists, that there has been no case of sickness or death in his family during the above period from zymotic diseases or such diseases as would naturally be occasioned by bad and unwholesome

water, and in his judgment such diseases are much less prevalent since the establishment of the present water supply than for a similar period just previous to said water supply being introduced.

ALEXIS CRANE.

Sworn to before me, this 15th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace

CHAUTAUQUA COUNTY, *ss.:*

W. A. KENT, being duly sworn, says that he resides in said city and has for several years last past; that he is connected with said water supply company and has been so connected for at least four years; that, in the summer of the present year, deponent spent considerable time and very extra pains in obtaining the vital statistics of said city and of the old village of Jamestown, for many years last past; that in making such investigation, he consulted the record of vital statistics of said village and all other sources from which he could derive any information; that the water works were built in 1882. From that time the number of deaths due each year to typhoid fever, the most thoroughly distinctive of this type of diseases, has been as follows:

In 1883, eleven deaths.
In 1884, three deaths.
In 1885, two deaths.
In 1886, none as yet to time of investigation, August 1, 1886.

From scarlet fever:

In 1883, four deaths.
In 1884, two deaths.
In 1885, one death.
In 1886, none as yet to date of investigation, August 1, 1886.

Deponent further says he believes there are no records of deaths in former years with which to compare the figures given above. The recording of vital statistics began with the year 1882, none having been kept previous to that date. There is, however, a record of deaths kept by the secretary of the Lake View Cemetery Association, but the figures taken from this source cannot be fairly compared with the vital statistics, as the former represent only the burials in this one cemetery and take no cognizance of the interments elsewhere in this and other places. It is interesting, however, to study these records, remembering that they represent only a part of the deaths that have occurred in Jamestown.

From typhoid fever, that last year, 1885, caused two deaths, there were:

In 1881, ten interments in Lake View.
In 1880, five interments in Lake View.
In 1879, three interments in Lake View.

In 1878, three interments in Lake View.
In 1877, one interment in Lake View.
In 1876, three interments in Lake View.
In 1874, eleven interments in Lake View.

From scarlet fever, as compared with one death in 1885, we find:
In 1881, eighteen burials in Lake View.
In 1880, five burials in Lake View.
In 1879, two burials in Lake View.
In 1878, three burials in Lake View.
In 1877, two burials in Lake View.
In 1876, six burials in Lake View.
In 1875, twenty-four burials in Lake View.

These figures do not include those persons whose death occurred elsewhere than in Jamestown.

Thus we see that while the city has been rapidly increasing in population the number of deaths from this class of diseases has been no less rapidly decreasing.

W. A. KENT.

Sworn before me this 18th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

STATE OF NEW YORK, Chautauqua County, *ss.:*

CHARLES J. JENNER and THOMAS T. CLUNEY being duly sworn, each for himself, says: The said Jenner that he is deputy sheriff of said county, and the said Cluney that he is chief engineer of the fire department and fire warden of said city, and both of said parties further say that on the 16th and 17th days of December, 1886, at the request of said water company, they drew water from each and every of the fire hydrants in said city, there being one hundred and four (104) in number scattered round in all the various localities of said city where water mains are laid. That they were both present in the getting of such water and filling and sealing the bottles herein mentioned. That a bottle of water was thus taken from each of said hydrants. That after thus filling said bottles they were, in the presence of both of us, corked up and sealed, and on the outside of each bottle was pasted on the number and date of taking the water.

(The number and location of each of the one hundred and four [104] hydrants here follow.)

Deponents further say that of the samples which contain small particles of vegetable fibre, nearly or quite all of them came from hydrants located on the dead ends of the system of water mains where there is little or no consumption.

Deponents also say that after the bottles were sealed, they were in our presence put into a box which was securely nailed and fastened up and the outside thereof directed as follows: "Dr. Lewis Balch, secretary of State Board of Health, Albany, New York, Erie Express."

CHARLES J. JENNER.
THOMAS T. CLUNEY.

Sworn before me this 18th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

JAMES RAWLEY, Jr., being duly sworn, says, that he resides in said city and saw the above named bottles corked and sealed and fastened up in said box, and the same thus sealed and fastened in said box, as per the above affidavits, was shipped as per said direction to said secretary, on the 18th day of December, 1886.

JAMES RAWLEY, JR.

Sworn before me this 18th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

STATE OF NEW YORK, CHAUTAUQUA COUNTY, *ss.:*

CHARLES J. JENNER and J. P. PENNOCK, being duly sworn, each for himself, says, that he resides in the city of Jamestown, said county; said Jenner is deputy sheriff of said county; said Pennock is a member of the board of health of said city and was a member of the board of health of the old village of Jamestown for at least the last two years of its existence; that on the 13th and 14th days of December, 1886, at the request of said water supply company, deponents, together, visited fifty-one individual water services in said city and in the presence of each other, tested each and every of them; that of the services so examined one was found to have been unused for the two months last past and the water discolored and containing fibres of vegetable growth; that from the remainder the water ran clear and of good appearance except in a few instances where some fibres of vegetable growth appeared; that where these fibres were found at first, when the water was allowed to run for a few minutes, they would, in nearly all instances, no longer appear; that when flushing of the pipes in the above manner did not serve to remove these fibres there usually seemed to be a lack of pressure, indicating to your deponents that said service pipes were stopped up in some manner; that in most

instances the water was without taste or odor; that at several services it was possible to examine the water while it was heated nearly or quite to boiling point and in none of these instances was any odor observable; that with the exceptions noted above the water appeared to be good and wholesome. That these services so by us tested, are located in various parts of the city and on both sides of Chautauqua outlet and at different and various distances from the main works. That our instructions from said company and our intentions were to give the supply a good and thorough test as the same was in the various and many localities in said city; that, in making this test, we acted in good faith.

CHARLES J. JENNER.
J. P. PENNOCK.

Sworn to before me, this 18th day of December, 1886.

E. E. WOODBURY,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

LABAN HAZELTINE, M. D., being duly sworn, says that he is a practicing physician in the city of Jamestown and has been for about seven years last past.

Since the establishment of the Jamestown Water Supply Company he has had cognizance of the same and of the water supplied by said company, and in his judgment and experience (taking into consideration the large increase in population) there has been no increase in the number of cases of sickness and deaths from zymotic diseases, and such diseases as would naturally be caused by the use of bad and unwholesome water, over a like number of years previous to the establishment of said water supply.

LABAN HAZELTINE. [SEAL.]

Sworn before me this 18th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

J. HARRY JONES, being duly sworn, says he resides at No. 29 Fairmount avenue in the city of Jamestown, and has resided at this locality for at least four years last past; that he has used the water as supplied by the Jamestown Water Supply Company since November 1, 1882, for domestic uses in his family, and has found the water during that time of a satisfactory quality and to all appearances pure and wholesome; deponent also says that at the present time and since the introduction of the lake water as

a part of the supply the water has been of excellent quality and entirely satisfactory, and in his judgment pure and wholesome. There has been times when a slight woody taste has been noticeable for a day or two at a time, but there has been no time that he has not used it for all the uses of his family.

(Copy.) J. HARRY JONES.

Sworn before me this 18th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

FRED. A. DORMAN, being duly sworn, says that he resides in the city of Jamestown, N. Y.; that he is the same person who made an affidavit of sample of water taken from the water service of E. D. Spaulding, at his green house; that one of said samples was taken November 10, and the other December 3, 1886; that, in taking the first sample, the water was first drawn in a sprinkler, holding six or eight quarts, and then the same of about a pint put into a bottle, which was the sample sent; that the other sample was taken from a barrel of water which deponent first drew from the service; that after thus drawing the water into the barrel, a scum arose upon the top of the water; this scum was taken off with a wash-dish and the bottle sent was filled from this wash-dish and sent; that deponent does not know when this service had been used before drawing these samples.

Deponent further says, that such service has been used right along since said times and has been comparatively good; that he has discovered, at times, a kind of vegetable fibre. Said service does not run into the house for domestic use, but at the said green house.

FRED. A. DORMAN.

Sworn before me, this 20th day of December, 1886.

E. E. WOODBURY,
Justice of the Peace.

CHAUTAUQUA COUNTY, *ss.:*

FRANK B. FARNHAM, being duly sworn, says that he resides in said city; that he did, on the twentieth instant, at the request of the said water supply company, obtain a sample of water from the water service of E. D. Spaulding, the same place named in the annexed affidavit; that the same, thus taken, was drawn into the bottle direct from the faucet; and the bottle thus filled is the same sample herewith sent and marked as follows: "Collected from faucet at E. D. Spaulding's green house, December 20, 1886. F. B. Farnham." That deponent saw such bottle, after being thus

filled by him, securely corked and sealed and marked as aforesaid, and expressed to said board of health.

FRANK B. FARNHAM.

Sworn before me, this 20th day of December, 1886.

D. D. WOODFORD,
Justice of the Peace.

STEVENS INSTITUTE OF TECHNOLOGY,
HOBOKEN, N. J., *December* 20, 1886.

DR. LEWIS BALCH, *Secretary of the New York State Board of Health:*

DEAR SIR. — I transmit herewith my analyses of the samples of the Jamestown water supply, collected by me at the time of your official inspection on the eighth and ninth instant. From these analyses, which give the composition of the water at the crib on Chautauqua lake, the flume, the pumping station, the driven-wells alone, and in the city distributing mains, it will be seen that the water of the driven-wells is the best.

I should, therefore, recommend that the water supply of Jamestown should be limited to the water taken from driven-wells, except for the following reasons:

1st. The water in the distributing mains at Jamestown acquired its offensive taste at a time when the water of the driven-wells only was used, and before any connection was made with Chautauqua lake or the outlet.

2d. The very large and unusual amounts of iron rust in the city pipes show that rapid and active changes are taking place in the pipes themselves, to which the bad taste of the water may be due. This probability is heightened by the fact that the water when taken from the faucet at the pumping station never has exhibited any other than an agreeable taste and odor.

I counseled the water company to take a part of its supply from Chautauqua lake (although I informed them at the same time that this water was inferior in quality to that taken from the driven-wells), in the hope that the addition of lake water would overcome that tendency to the enormous multiplication of spores to which driven well water is always peculiarly liable.

I have requested them to so modify their system of distribution that the pipes shall not at times contain air and at times water. They are at present making this experiment, and when it has had a trial I shall know to what extent the distributing system is chargeable with the non-potability.

Until I do know I am unwilling to take the responsibility of advising them to extend their driven-well system, for the fear that I may only be leading them into worse difficulties than ever.

Yours very respectfully,

ALBERT R. LEEDS.

STATE OF NEW JERSEY, }
HUDSON COUNTY, CITY OF HOBOKEN, } ss.:

Albert R. Leeds, who is personally known to me, affirms the accompanying certificates of analyses to be an accurate and complete statement of the result of his analyses and that his report is a true statement of his conclusions.

ALBERT R. LEEDS.

Subscribed and sworn to before me, }
this 20th day of December, 1886. }

F. LUTHIN,
Notary Public.

HOBOKEN, N. J., *December* 20, 1886.

CERTIFICATE OF WATER ANALYSIS.*

From whom received, collected by myself; No. 1028; when received, December 9th; title of label, J. W. S. (I); source of sample, Chautauqua lake crib, December 8, 1886; color, 1.0; taste, pleasant; smell, none.

DATA OBTAINED BY ANALYSIS:

	Parts in 100,000.	Grains per Gallon.
1. Free ammonia	0.012	0.007
2. Albuminoid ammonia	0.03	0.0175
3. Oxygen required to oxidize organic matter	0.3399	0.198
4. Nitrites	0.0004	0.00023
5. Nitrates	0.0613	0.0357
6. Chlorine	0.2	0.1166
7. Total hardness	3.73	2.175
8. Permanent hardness	....	....
9. Temporary hardness	....	....
10. Total solids	5.2	3.03
11. Mineral matter	3.0	1.75
12. Organic and volatile matter	2.2	1.28
13. Other data, when required for judgment:		
Oxygen dissolved in one liter	7.794 c. c.	
Carbonic acid dissolved in one liter	1.559 c. c.	
Nitrogen dissolved in one liter	16.237 c. c.	
Total gases dissolved in one liter	25.590 c. c.	

(Signed.) ALBERT R. LEEDS,
Professor of Chemistry, Stevens Institute of Technology.

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* NOTE.—The U. S. gallon is taken at 58,318 grains.

HOBOKEN, N. J., *December* 20, 1886.

CERTIFICATE OF WATER ANALYSIS.*

From whom received, collected by myself; No. 1029; when received, December 9th; title of label, J. W. S. (II); source of sample, flume, December 8, 1886; color, 1.5; taste, pleasant; smell, earthy.

DATA OBTAINED BY ANALYSIS:

	Parts in 100,000.	Grains per Gallon.
1. Free ammonia	0.0165	0.0096
2. Albuminoid ammonia	0.0257	0.0146
3. Oxygen required to oxidize organic matter	0.35	0.204
4. Nitrites	0.0004	0.00023
5. Nitrates	0.0818	0.0473
6. Chlorine	0.15	0.0875
7. Total hardness	5.64	3.289
8. Permanent hardness	....	....
9. Temporary hardness	....	....
10. Total solids	12.20	7.114
11. Mineral matter	9.10	5.307
12. Organic and volatile matter	3.10	1.807
13. Other data, when required for judgment:		
Oxygen dissolved in one liter	7.274 c. c.	
Carbonic acid dissolved in one liter	3.117 c. c.	
Nitrogen dissolved in one liter	16.368 c. c.	
Total gases dissolved in one liter	26.759 c. c.	

(Signed.) ALBERT R. LEEDS,

Professor of Chemistry, Stevens Institute of Technology.

HOBOKEN, N. J., *December* 20, 1886.

CERTIFICATE OF WATER ANALYSIS.*

From whom received, collected by myself; No. 1031; when received, December 9th; title of label, J. W. S. (IV); source of sample, faucet at pump works, Jamestown, December 8, 1886; color, 1.5; taste, pleasant; smell, slightly earthy.

DATA OBTAINED BY ANALYSIS:

	Parts in 100,000.	Grains per Gallon.
1. Free ammonia	0.008	0.0047
2. Albuminoid ammonia	0.02	0.01166
3. Oxygen required to oxidize organic matter	0.3914	0.2282
4. Nitrites	0.0002	0.00012
5. Nitrates	0.604	0.0606
6. Chlorine	0.65	0.379

* NOTE.—The U. S. gallon is taken at 58,318 grains.

	Parts in 100,000.	Grains per Gallon.
7. Total hardness	6.32	3.686
8. Permanent hardness	....	....
9. Temporary hardness	....	....
10. Total solids	14.60	8.515
11. Mineral matter	12.00	6.998
12. Organic and volatile matter	2.60	1.516
13. Other data, when required for judgment:		
Oxygen dissolved in one liter	5.325 c. c.	
Carbonic acid dissolved in one liter	3.244 c. c.	
Nitrogen dissolved in one liter	15.982 c. c.	
Total gases dissolved in one liter	24.551 c. c.	

(Signed.) ALBERT R. LEEDS, PH. D.,
Professor of Chemistry, Stevens Institute of Technology.

HOBOKEN, N. J., *December* 20, 1886.

CERTIFICATE OF WATER ANALYSIS.*

From whom received, collected by myself; No. 1032; when received, December 9th; title of label, J. W. S. (V); source of sample, pump-well fed by driven wells, December 8, 1886; color, .0; taste, pleasant; smell, none.

DATA OBTAINED BY ANALYSIS:

	Parts in 100,000.	Grains per Gallon.
1. Free ammonia	0.0	0.0
2. Albuminoid ammonia	0.007	0.00408
3. Oxygen required to oxidize organic matter	0.1648	0.096
4. Nitrites	0.0016	0.00093
5. Nitrates	0.187	0.109
6. Chlorine	0.55	0.3208
7. Total hardness	12.26	7.15
8. Permanent hardness	....	....
9. Temporary hardness	....	....
10. Total solids	18.10	10.555
11. Mineral matter	15.10	8.806
12. Organic and volatile matter	3.00	1.749
13. Other data, when required for judgment:		
Oxygen dissolved in one liter	5.975 c. c.	
Carbonic acid dissolved in one liter	1.818 c. c.	
Nitrogen dissolved in one liter	14.289 c. c.	
Total gases dissolved in one liter	22.082 c. c.	

(Signed.) ALBERT R. LEEDS,
Professor of Chemistrg, Stevens Institute of Technology.

* NOTE.—The U. S. gallon is taken at 58,318 grains.

HOBOKEN, N. J., *December* 20, 1886.

CERTIFICATE OF WATER ANALYSIS.*

From whom received, collected by myself; No. 1,033; when received, December 9th; title of label, J. W. S. (VI); source of sample, office Jamestown Water Supply Company, December 8, 1886; color, 1.5; taste, slightly earthy; smell, slight.

DATA OBTAINED BY ANALYSIS:

	Parts in 100,000.	Grains per Gallon
1. Free ammonia	0.0	0.0
2. Albuminoid ammonia	0.0175	0.0102
3. Oxygen required to oxidize organic matter	0.3914	0.2283
4. Nitrites	0.0004	0.00023
5. Nitrates	0.187	0.109
6. Chlorine	0.55	0.3208
7. Total hardness	7.88	4.596
8. Permanent hardness	....	....
9. Temporary hardness	....	....
10. Total solids	15.20	8.864
11. Mineral matter	12.60	7.348
12. Organic and volatile matter	2.60	1.516
13. Other data, when required for judgment:		
Oxygen dissolved in one liter	5.715 c. c.	
Carbonic acid dissolved in one liter	2.208 c. c.	
Nitrogen dissolved in one liter	14.680 c. c.	
Total gases dissolved in one liter	22.603 c. c.	

(Signed) ALBERT R. LEEDS,
Professor of Chemistry, Stevens Institute of Technology.

* NOTE — The U. S. gallon is taken at 58,318 grains.

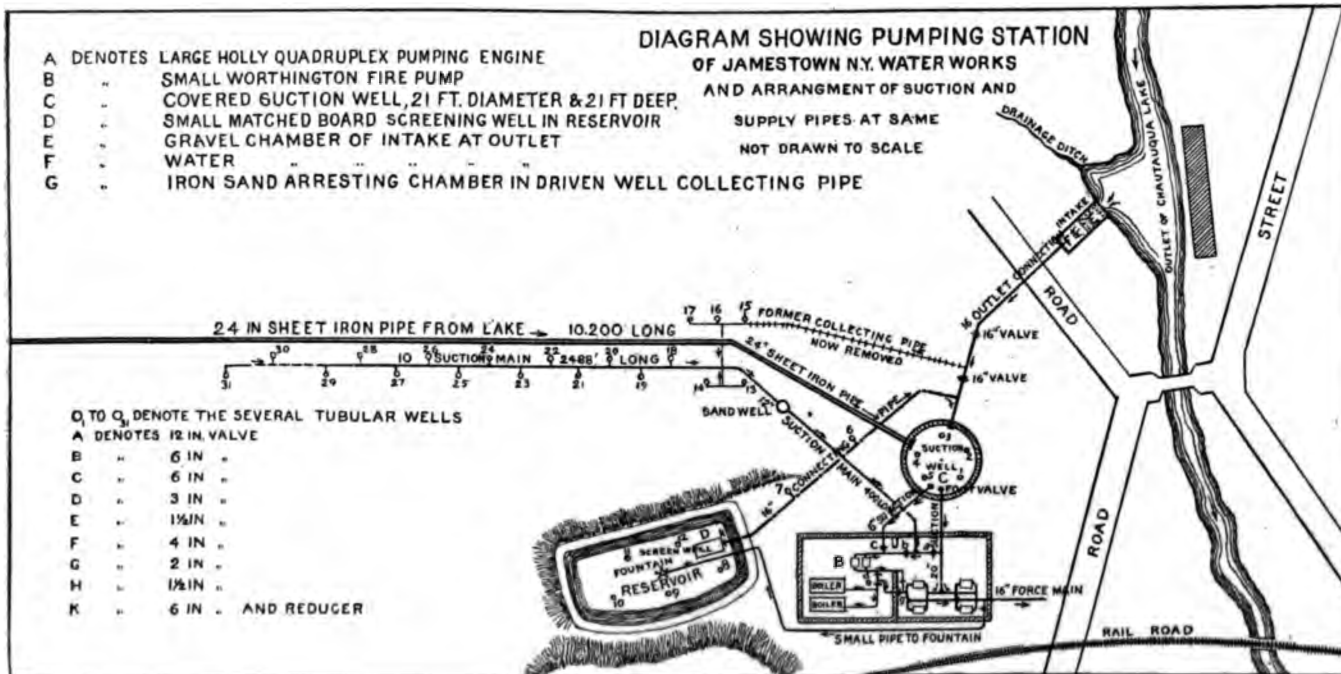
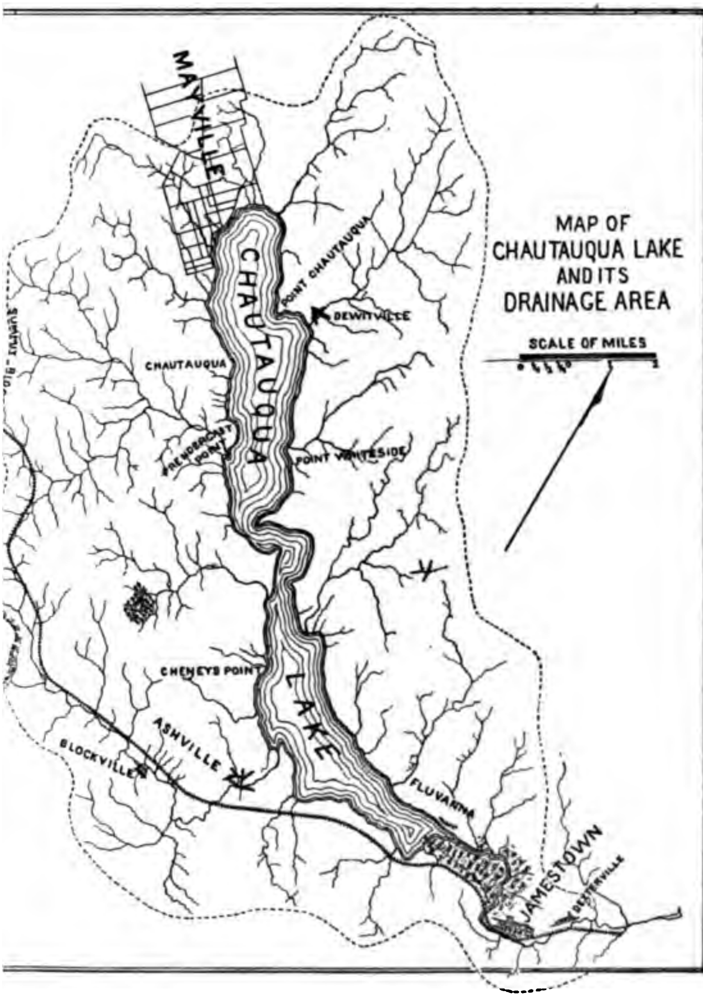
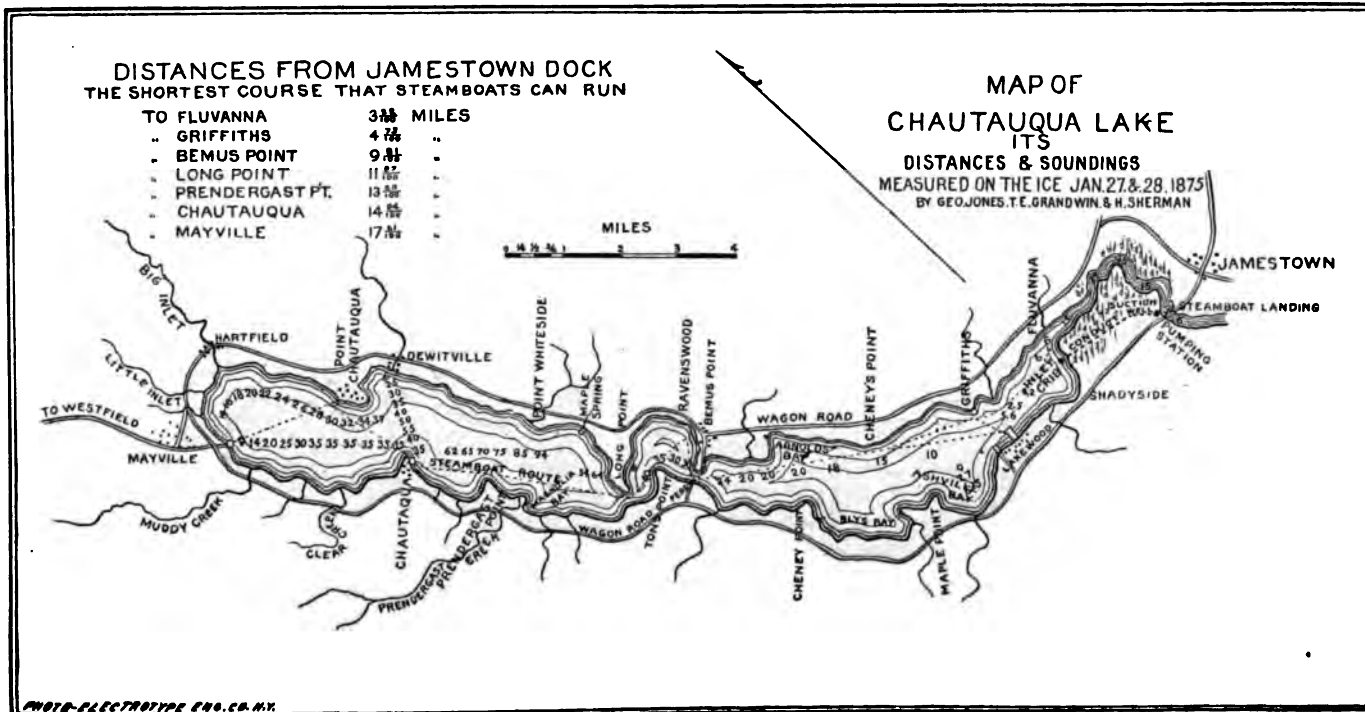


DIAGRAM SHOWING PUMPING STATION
OF JAMESTOWN N.Y. WATER WORKS
AND ARRANGMENT OF SUCTION AND
SUPPLY PIPES AT SAME
NOT DRAWN TO SCALE
A DENOTES LARGE HOLLY QUADRUPLEX PUMPING ENGINE
B " SMALL WORTHINGTON FIRE PUMP
C " COVERED SUCTION WELL, 21 FT. DIAMETER & 21 FT DEEP.
D " SMALL MATCHED BOARD SCREENING WELL IN RESERVOIR
E " GRAVEL CHAMBER OF INTAKE AT OUTLET
F " WATER " " " " "
G " IRON SAND ARRESTING CHAMBER IN DRIVEN WELL COLLECTING PIPE
24 IN SHEET IRON PIPE FROM LAKE → 10.200 LONG
SUCTION MAIN 2488' LONG
FORMER COLLECTING PIPE NOW REMOVED
24" SHEET IRON PIPE
OUTLET CONNECTING INTAKE
16" VALVE
16" VALVE
FOOT VALVE
SUCTION WELL C
SAND WELL
SUCTION MAIN
CONNECT. MAIN
16" FORCE MAIN
SMALL PIPE TO FOUNTAIN
BOILER
BOILER
SCREEN WELL
FOUNTAIN
RESERVOIR
DRAINAGE DITCH
OUTLET OF CHAUTAUQUA LAKE
STREET
ROAD
ROAD
RAIL ROAD
O_1 TO O_{31} DENOTE THE SEVERAL TUBULAR WELLS
A DENOTES 12 IN. VALVE
B " 6 IN "
C " 6 IN "
D " 3 IN "
E " 1½ IN "
F " 4 IN "
G " 2 IN "
H " 1½ IN "
K " 6 IN " AND REDUCER


MAP OF
CHAUTAUQUA LAKE
AND ITS
DRAINAGE AREA
SCALE OF MILES
MAYVILLE
CHAUTAUQUA
LAKE
POINT CHAUTAUQUA
CHAUTAUQUA
POINT WHITESIDE
CHENEYS POINT
ASHVILLE
BLOCKVILLE
FLUVANNA
JAMESTOWN


DISTANCES FROM JAMESTOWN DOCK
THE SHORTEST COURSE THAT STEAMBOATS CAN RUN
TO FLUVANNA 3 MILES
" GRIFFITHS 4 "
" BEMUS POINT 9 "
" LONG POINT 11 "
" PRENDERGAST PT. 13 "
" CHAUTAUQUA 14 "
" MAYVILLE 17 "
MILES
MAP OF
CHAUTAUQUA LAKE
ITS
DISTANCES & SOUNDINGS
MEASURED ON THE ICE JAN. 27 & 28, 1875
BY GEO. JONES, T. E. GRANDWIN & H. SHERMAN
JAMESTOWN
STEAMBOAT LANDING
PUMPING STATION
SHADYSIDE
LAKEWOOD
FLUVANNA
GRIFFITHS
CHENEYS POINT
WAGON ROAD
ARNOLDS BAY
ASHVILLE BAY
BLYS BAY
MAPLE POINT
CHENEY POINT
BEMUS POINT
RAVENSWOOD
TONG POINT
LONG POINT
MAPLE SPRING
POINT WHITESIDE
STEAMBOAT ROUTE
PRENDERGAST POINT
PRENDERGAST CREEK
CHAUTAUQUA
DEWITVILLE
POINT CHAUTAUQUA
CLEAR CREEK
MUDDY CREEK
MAYVILLE
HARTFIELD
BIG INLET
LITTLE INLET
TO WESTFIELD
PHOTO-ELECTROTYPE ENG. CO. N.Y.

The Governor requiring more definite statement in regard to the nuisances found sent the following communication to the State Board of Health:

STATE OF NEW YORK.

EXECUTIVE CHAMBER,
ALBANY, *February* 19, 1887.

To the State Board of Health of the State of New York:

A requisition having been heretofore made to your honorable board by the undersigned, in pursuance of the statute in such case made and provided, to examine into an alleged nuisance or nuisances affecting the security of life and health of the city of Jamestown, N. Y., and in that locality, and examination having been made by said Board in conformity to said requisition, into the said alleged nuisance or nuisances, and a report of the results thereof having been heretofore made to me within the limits of time required therefor, and the said Board having recommended, for the consideration of the undersigned certain matters and things relating to said alleged nuisance or nuisances and the causes thereof.

Now, therefore, for greater certainty as to the nature and extent of the alleged nuisance or nuisances, if any, found to exist by said report, reference being had thereto, the said State Board of Health is respectfully required within ten days to specifically find and certify to me the things, if any, found to be a nuisance or nuisances in the locality aforesaid, and the extent and nature thereof.

DAVID B. HILL, *Governor.*

On the 23d of February, 1887, the State Board of Health met and transmitted the following findings to his excellency:

To Hon. DAVID B. HILL, *Governor of the State of New York:*

SIR. — At a meeting of the State Board of Health, held at the Capitol, in the city of Albany, on the 23d day of February, 1887, a quorum being present, in obedience to a requisition heretofore made to this Board on 10th day of July, 1886, the State Board of Health find and certify:

First. That the business of the "Jamestown Water Supply Company," in supplying to the inhabitants of the city of Jamestown, for drinking and cooking purposes, water from Chautauqua lake, from its present source of supply; and through its present crib; and through its present conduit from the lake to its pumping station; and from the outlet of Chautauqua lake; and through its present system of distributing mains and pipes, is a nuisance affecting the security of life and health in the said city, and of menace and danger to the public health.

Second. That, as a source of water supply to the inhabitants of the city of Jamestown, the foot of Chautauqua lake, and Chautauqua lake at any point therein, of a depth of less than ten feet in the summer months; and Chautauqua lake, unless water taken

therefrom is filtered by an adequate system of filtration, immedidiately before distribution, and the outlet of Chautauqua lake are nuisances affecting the security of life and health in the said city, and of menace and danger to the public health.

Third. That, as a means of obtaining water to supply the inhabitants of the city of Jamestown, the crib of "The Jamestown Water Supply Company," located in the foot of Chautauqua lake, and the whole of the conduit of said company, from the lake to its pumping station, except the portion thereof composed of cast-iron pipe, and the intake gravity pipe leading from the outlet to the suction well of said company, are nuisances affecting the security of life and health in said city and of menace and danger to the public health.

Resolved, That the secretary of this Board report and certify said findings and this resolution to his excellency, the Governor.

Adopted.

To His Excellency, the Governor:

I, Lewis Balch, Secretary of the State Board of Health, report and certify the within certificates and findings and resolution were duly adopted by said board at the within meeting, and are of the minutes thereof.

Witness my hand and the seal of said Board, at Albany, [L. S.] this 23d day of February, 1887.

LEWIS BALCH, M. D., *Secretary*.

After the presentation of these subsequent findings, the water company asked for a stay of proceedings for sixty days, to enable it to carry out the suggestions of the State Board of Health, in sinking larger wells to procure an ample supply of water therefrom, and to obviate the necessity of resorting to either the lake or its outlet.

At the end of this time, being informed that the condition of the water supply was satisfactory, the company having sunk larger wells; the information was laid before the Governor, who took the action indicated below:

STATE OF NEW YORK.

EXECUTIVE CHAMBER,
ALBANY, *May* 4, 1887.

To the Jamestown Water Supply Co., Jamestown, N. Y.:

GENTLEMEN. — The report and findings of the State Board of Health, relating to its examination of the water supply of the city of Jamestown, submitted to me on the 23d of February, 1887, in obedience to my requisition, dated the 10th of July, 1886, has been approved by me and filed in the office of the Secretary of State. Having been subsequently informed by the State Board of Health that measures tending to remedy the evils complained of and reported upon have been taken by you, the issuance of an order therein is suspended.

DAVID B. HILL, *Governor*.

CONTAGIOUS AND INFECTIOUS DISEASES.

REPORT.

During the past year active cognizance has been taken of the existence of contagious and infectious diseases in the State.

Small-pox.

Early in April report reached the central office of the appearance of small-pox at shaft No. 3, along line of new aqueduct, in the person of an Irish workman. A serious epidemic was threatened unless prompt measures of vaccination and quarantine were adopted. The sick patient was quarantined, the board of health of New Castle organized, the health officers along the line admonished to institute vaccination among the laborers, arrangements made for an ample supply of good trustworthy virus, and a pressure brought to bear upon the contractors to induce them to refuse employment to hands who were unwilling to be vaccinated. In this way the danger, which at one time threatened to be serious, was averted, with but few fresh cases, and no interference with the work. A case of small-pox reached Yonkers, contracted at shaft No. 3, but it was quickly taken hold of by the efficient health officer and no further spread was reported.

Later on, November twenty-sixth, the disease reappeared in Yonkers in the person of a boy eleven years old, followed by two other cases in the same family, the father and brother.

The origin of the second appearance has not been traced. The cases were promptly removed to the hospital and all exposed persons vaccinated.

One case was also reported from Gravesend, but through the commendable energy of the board of health, its ravages were limited to the initial case.

A few cases were reported from Brooklyn, and one from New York city, but the State as a whole has been measurably free from the disease, and the general vaccination which the Montreal epidemic induced, makes it very improbable that small-pox will gain any foot-hold in the State this winter.

Diphtheria, Scarlet and Typhoid Fevers.

Diphtheria, scarlet and typhoid fevers prevailed somewhat extensively over the State, and were largely traceable to polluted ground water and ground air in and about the premises. The efforts of the Board have been constant in urging the removal of those

insanitary conditions which concededly are potent factors in causing and intensifying these diseases. The leaching privy vault still remains in many places to pollute the soil and water in wells, undrained swamps in others, and populous centers are found without either drainage or sewerage, although there is great awakening in reference to these matters.

At the Home for the Friendless in Poughkeepsie, investigated by Dr. F. C. Curtis, diphtheria had made its appearance for the second time; the drainage and plumbing had been all investigated and remodeled, so that the reappearance of the disease could not be traceable to any defect in these arrangements. Dr. Curtis thinks that probably the disinfection and purification had not been adequate, and recommended that this be made more thorough.

At Walden where diphtheria prevailed there were general insanitary conditions sufficient to account for almost any such epidemic. These are set forth in the report of Dr. Curtis.

PLEURO-PNEUMONIA AND OTHER CATTLE DISEASES.

The Board was called upon to investigate several cases of cattle disease, some of which, although not communicable to man in the way of contagion, were yet threatening the public health through the food and milk supply.

From Gardiner, Ulster county, came an urgent appeal for aid in suppressing pleuro-pneumonia. Prof. James Law, veterinary surgeon, was at once sent, who quickly indentified the disease, and gave proper instructions in the emergency. His report of what he found and the treatment adopted is printed in this section.

At Floyd, Oneida county, an outbreak of "black murrain" was reported, and the State Board's aid solicited. Dr. Edward Moore of Albany was despatched to the place, and found the disease to be splenic apoplexy. His report of the condition of things there, and the course he pursued, is quite graphic and is herewith presented.

A telegraphic notice was received from the constable at Katonah of the existence of pleuro-pneumonia on the farm of Hiram Jelliff, who apparently did not know how to act in the premises. Dr. Edward Moore of Albany was sent to examine into the matter, give suitable advice, and report to this office. His report disclosed the need of prompt action by the local boards of health in that section of the State, and letters apprising them of the danger to the food and milk supply, and their duty in the premises, were immediately sent to the health officers.

Several cases of glanders were reported and disposed of. It is gratifying to note that on the whole local boards of health are on the alert against these and kindred diseases which affect so directly the material prosperity of the State.

REPORT ON DIPHTHERIA IN HOME OF THE FRIENDLESS, POUGHKEEPSIE.

ALBANY, *November* 1, 1886.

Dr. LEWIS BALCH, *Secretary of the State Board of Health:*

DEAR SIR.— In the Home of the Friendless, in Poughkeepsie, there occurred an outbreak of Diphtheria last June. It was not virulent, a single death occurring out of a considerable number of cases. Prior to, and accompayning it, there was a frequent occurrence of cases of vomiting, not alone in those having diphtheria, but independent of it. This came suddenly, while the person affected was in bed or at meals; it was unaccompanied by diarrhœa, but with some there was febrile disturbance lasting, at most, twenty-four hours. Adults as well as children were affected. Gastric disturbance without nausea, with slight general malaise was also complained of.

The institution was partly cleared of its inmates and the building fumigated with sulphur. At the same time the plumbing was generally overhauled.

In October, occupation having been fully resumed, there was a recurrence of the epidemic, and two fatal cases occurred, one of them being attributed to croup.

The building is a large, three story edifice, situated on an elevated site, with extensive premises about it. The best residences in the city are adjacent to it, the locality being sightly and well drained. It furnished accommodation for forty children and has been in existence about thirty years.

The cellar is dry and well ventilated. Bottom and sides are covered with cement. The plumbing as it now is, since the recent repairs, is after approved methods and I did not find that the traps are syphoned nor was there evidence of leakage on applying the peppermint test. The building throughout is clean, and abundant air space for the inmates is furnished.

The building is wholly supplied with water from the public supply. The yard about the house is well kept; a privy vault not far from the building has been filled up recently. The source of milk supply has been changed since the first outbreak. Concluding that no local cause for the disease, now existing, is apparent, I would suggest the thorough destruction of possible contagia by fumigation and have advised the health officer and authorities to that effect, and as to the methods.

Respectfully yours,

F. C. CURTIS.

REPORT ON THE SANITARY CONDITION OF THE VILLAGE OF WALDEN, ORANGE COUNTY.

LEWIS BALCH, M. D., *Secretary of the State Board of Health :*

DEAR SIR — On the fourth of December a petition was received at this office from citizens of the village of Walden, Orange county, for an examination into the causes of an outbreak of diphtheria there. In response to this and at your instance I went to Walden for the purpose of making an investigation into its sanitary condition.

This village is in the town of Montgomery, in the northern part of Orange county, on the Wallkill Valley Railroad. It has a population of about 2,500, and is growing rapidly, having more than doubled its population in the last fifteen years. It is situated upon the Wallkill river which is a considerable and very rapid stream, furnishing a large water power to a number of manufactories, and passing through the village between precipitous rocky banks forty or fifty feet high. The topography of the village is somewhat irregular and the surface alluvium lies for the most part upon a bed of clay at varying depths, but generally but a few feet below ground. The wells, which are the only source of water supply aside from cisterns, are generally about thirty-five feet deep, penetrating the clay to gravel. The water of this limestone region is generally quite hard. A considerable portion of the more newly built-up portion of the village lies upon made ground, not many years ago the surface having been marshy or covered with standing water. Some of the principal streets have sewers; they are generally of large sized vitrified pipe without cemented joints. They carry only sink and laundry water. The fall is abundant, the drainage being into the Wallkill and a small tributary.

The sanitary history of Walden is reported to have been fairly good. For years malarial diseases were very severe, but are less so of late. Typhoid fever has prevailed to some extent and so has diphtheria. Cerebro-spinal fever is not mentioned as having been observed by the local physicians with whom I conversed.

The present outbreak of diphtheria began to show itself apparently in September. It is now abating, but three or four cases being now noted. There have been twelve or fourteen deaths. Exact statistics could not be obtained as there is no board of health in active existence.

In searching for the cause of diphtheria in a locality we have a few pretty thoroughly established data to work upon. We know that it flourishes in the presence of decomposing organic filth; that it is taken into the system through the medium of impure drinking water and through the medium of impure inspired air in houses; that dampness favors its development and that dampness

of cellars or basements of houses by reason of a high level of ground water is an especially frequent and well established cause for it, since this dampness favors the development of simple sore throat and since, especially in a populous village, the moisture finds its way into the house from soil that is laden with impurity, and thus the air of the house becomes defiled; that the air from sewers and cess-pools if admitted to the house in the same manner defiles the air of the house and is a potent factor in causing this disease. When we add to these factors of an unsanitary character associated with defiled air and defiled drinking water, those associated with its infectious nature, viz.: the clinging of the contagium to the infected dwellings where the disease has existed for a long time and the possibility of its transportation by the unaffected persons residing in infected dwellings, or by fomites or clothing from the sick, we have perhaps said all that we positively know of the conditions upon which the development and spread of diphtheria depends.

I find conditions existing in Walden which come under the ban of these elements of causation. There are in the first place the common unsanitary conditions prevailing in so many villages; the existence in the same yard of a well, a leaching privy pit and leaching cesspool. In many cases instead of the latter, slops are thrown upon the surface to find their way into the street gutters. There are also not a few pig-styes in the village. The effect that all these have upon the wells is apparent. This filth finds its way through the alluvium to the impervious clay, and under the impulse of the fall rains is inevitably carried to the well which is cut through this. There is no attempt to diminish the defilement of the soil. The privy pits are seldom cleaned and are never tight. The same is true of the cesspools. The street sewers into which only kitchen waste is thrown have open joints, and no restriction is placed upon the emptying of slops into the street gutters, where there is no sewer connection. It is needless to analyze the water of wells so situated to show their defilement.

Then as to the condition of the air in the houses. As already stated, through some parts of the village the cellars are wet; in fact after severe rains the water is two or three feet deep in some. In one that I went the bottom was quite muddy. In some cases I believe the water sets back from the sewers, which carrying storm water are occasionally overcharged, but generally the moisture finds its way from the surrounding soil and has done so this fall to an unusual degree on account of its being an unusually rainy season. As the houses are warmed and closed on the approach of cool weather an upward draught is induced whereby this cellar air, rendered thus damp and impure, is drawn into all the rooms above. The importance of this factor in Walden seems more apparent since diphtheria evidently prevailed more in that part of the village where this condition most existed.

But another source of defilement of the air of the house is almost universal, that is the absence of traps to sink waste pipes. Of a number of houses that I visited where there was sewer connection, I found but one that was provided with any semblance of a trap. Manifestly the sewer air always has access to such houses and as the only connection is usually in the basement every facility is offered for this air pervading the entire house.

All these conditions, affecting the water and the house air, have been aggravated during the fall by the increased rain fall and in the case of the latter by the approach of cool weather, conditions that were synchronous with the outbreak of the disease. Besides there was no supervisory direction in regard to quarantining and fumigating beyond that voluntarily done by attending physicians, as far as I could learn. Acting under their village charter the provisions of which in this respect are set aside by the Health Law of May, 1885, the Board of Trustees have constituted themselves a Board of Health, but they have no health officer.

These unsanitary conditions without doubt had a part in keeping up this outbreak and as factors in the sanitary problem of the village, for the future at least, are very important. But there seems to be more direct interest connected with the school. In many of our epidemics of diphtheria we have found the origin and development entirely in the school-house, so that it always is one of the first points for investigation. There is but one school building in the village. This is a rather old but well preserved structure, in fairly commodious grounds which are cleanly, and consists of a main portion with wings, all one story in height with a high well lighted basement or cellar beneath. It is heated by three portable heaters in the basement; these are not provided with cold air boxes, the air of the basement being warmed and carried into the building. This basement is clean and free from litter, with a cement bottom a good deal broken. At one side, where a defective leader came down from the roof the sides and floor were damp, the rest being apparently dry. I learned, however, that at the opening of the school the bottom and sides of the basement were covered with a growth of green mould, from which it is evident that general dampness of the basement exists. I learned that the walls of the school rooms were also often so wet with moisture from some source that it was impossible to use the blackboards covering them. The building is situated in that part of the village where damp cellars are found and not far from the submerged spot to which reference has been made.

The cubical contents of the rooms of the school, together with the average daily attendance of scholars in each room during the first month of the present session, have been furnished me by Mr. Herbert J. Jones, the principal, and are as follows:

School-room.	Cubic feet.	Average daily attendance.
D. Primary	6,885	43
C. Primary	6,885	43
A. Primary	13,770	44
Intermediate	5,670	27
Senior	5,670	30

From this it appears that the amount of air space allowed to each scholar is for each room as follows: 160 cubic feet, 160 cubic feet, 313 cubic feet, 210 cubic feet and 189 cubic feet. This is the air space allowed for the average attendance; at times the attendance is very much larger, and the air space, per capita, accordingly lessened. To preserve pure air in a permanently occupied house, sixty cubic feet per minute is required; in a school-room, occupied but a short time and frequently aired by sweeping draughts, half this amount is considered allowable. If an occupants starts with 160 cubic feet of perfectly pure air as his allowance, he will exhaust it, therefore, in about five minutes and will need a fresh supply ten or twelve times in the hour. This would be impossible without creating dangerous draughts. As to the means of effecting this change they are inadequate. Some rooms are supplied with one or two small flues, capable of serving the needs of but a small number of persons. The windows are not large and have small, old-fashioned panes, and in some rooms are only on one side of the room. There are no corridors in the building.

I think that inasmuch as the heated air is taken from the basement, which should never be done, but especially when there is every reason to believe that the basement air is damp and as a consequence defiled, and inasmuch as it is evident the school-rooms are much overcrowded and the chances for ventilation are imperfect, without making note of other faults such as bad floors and walls, imperfect light, improper seats and general unattractive appearance, it will appear that this school is a potential factor in causing sickness, and, if not originating at least maintaining an epidemic of diphtheria. It is a significant fact that the present epidemic was synchronous in its outbreak and abatement with the opening and closing up of the school, the latter having been done about ten days before my visit. Cases of the disease, however, occurred among those not attending the school, and while a careful study of each might perhaps trace it to this source, I am inclined to think that other unsanitary conditions in the village already noted had a part in the outbreak, and that the epidemic was precipitated by the fall rains which acted to intensify them all.

As to the remedy, not so much for the abating epidemic but for the conditions which are existing and ready to bring another:

First. The present school building should be at once provided with cold air boxes for the furnaces, more efficient means of ven-

tilating secured and the number of scholars kept at a safe limit by providing other rooms if necessary. It ought, moreover, to be fumigated, I think. These are immediate needs; in the near future a larger and better building should be erected and the soil on which it is built, or that of the present building if retained, must be well drained.

Second. In those parts of the village where damp cellars exist there is urgent need of soil drainage. This can be effected by agricultural tile laid in the ditch with the sewer, with connections to lots and yards needing drainage. Of more immediate necessity, every house connection should be at once provided with a trap, the privy pits should be cleaned, and as far as possible, water tight receptacles, in which dry earth or ashes as absorbents are daily placed, substituted; the water of wells if used should be boiled before being drank, and pig-styes and stables kept clean or abolished and general sanitary regulations of a common sort instituted and maintained. A well devised separate system of sewerage, together with the introduction of a public water supply from a clean source outside the village may well be thought of for the near future. Situated as it is there is no reason why Walden should not be as salubrious as any village in the State. A healthy public sentiment on sanitary matters exists among the inhabitants, as appeared in the assembling of a large gathering of representative citizens during the evening of my stay, and their interest in health conditions there, which I represented to them much according to the tenor of this report.

Respectfully yours,

F. C. CURTIS, M. D.

December 16, 1886.

REPORT ON PLEURO-PNEUMONIA AT GARDINER, ULSTER COUNTY, NEW YORK.

CORNELL UNIVERSITY, ITHACA, N. Y.,
September 3, 1886.

Dr. LEWIS BALCH, *Secretary State Board of Health:*

DEAR SIR.— In compliance with your telegram I have visited the herd of Thomas E. Barlow, west of Gardiner, Ulster county, N. Y., and investigated the prevailing disease.

I am happy to say that it is not the contagious pleuro-pneumonia, or lung plague, though in most cases the lungs have been the seat of morbid processes leading to excited breathing, cough, crepitation, and even dullness on percussion. The symptoms during life, however, showed a marked absence of the extensive exudates and consolidation which is such a marked feature of lung plague, and on *post-mortem* examination the interlobular exudate was found to be almost entirely wanting, and the consolidation was confined to one or two lobulettes at a given point, and was of the nature of splenization rather than hepatization.

The lymphatic glands throughout the body showed slight congestion or pigmentation, while many of the smaller mediastinal, bronchial and mesenteric glands were strongly charged with blood, and of a deep dark red (Port wine hue). The fever ran high in acute cases, altogether disproportionately so to the comparatively slight morbid lesions, and the victims remained sick for a length of time and fell off materially in condition. I did not find the engorgement of the spleen nor the suddenly fatal results which usually characterize genuine anthrax, yet so far as they went the phenomena shown in the cattle indicated a bacteridian anthracoid disease, and this was confirmed by the presence of circumscribed circular sloughing sores, one-third inch in diameter, on the hands and wrists of Mr. Barlow and one of his men who had handled the sick and the carcasses.

Out of a herd of eighty-nine head twelve have died (two cows and ten heifers), and at the time of my visit it seemed as if one half of the remainder were either slightly affected or had been so.

Regarding the source of the infection, it has probably been imported, as the owner has been buying a good many high class stock, and although his farm cannot be said to be wet or marshy, yet lying on a branch of the Wallkill river it contains a sufficiency of low land with a close impervious subsoil to preserve a germ of this kind for some time if once introduced.

As it would be impossible to speedily purify the soil. I had the whole herd placed on a tonic and antiseptic regimen, including daily doses of sulphate of iron and carbolic acid, others of chlorate

of potash and iodide of potassium, and still others of bichromate of potassa, apportioning the amount to suit the different ages.

I further sent for a hypodermic syringe and inoculated all (save a few calves which were already manifestly ill) with the sterilized infusion of the flesh of an animal killed for the purpose, the product having been retained for an hour at a temperature of from 140 to 160 Fahrenheit. This I have resorted to in various other herds similarly affected and with excellent results, the influence of a slight dose of the *ptomaines* of the bacteria, conferring upon the system a certain antagonism and power of resistance to the germ itself.

As the affection is one which tends to confine itself to particular soils in which it can be preserved, and as Mr. Barlow's herd has now been subjected to its influence almost without exception (by natural infection or by inoculation) I apprehend little further trouble in that particular herd, nor any risk of the extension of the illness to his neighbor's stock, unless they trespass on his pastures.

Respectfully,

JAMES LAW,
State Veterinarian.

REPORT ON PLEURO-PNEUMONIA IN TOWN OF BEDFORD, WESTCHESTER COUNTY.

ALBANY, N. Y., *October* 31, 1886.

LEWIS BALCH, M. D., *Secretary State Board of Health.*

MY DEAR SIR. — At your request I visited the farm of Hiram Jeliff, town of Bedford, Westchester county, N. Y., and about two miles distant from Katonah, on the Harlem railroad. I arrived there on the thirtieth inst. I had a cow killed that in my opinion was in the last stages of pleuro-pneumonia contagiosa. *Post mortem* conclusively demonstrated that the diagnosis was correct.

The thoracic cavity contained several gallons of fluid. The left lung was about four times its normal size, and its weight proportionately greater.

Tremendous deposits of yellow false membranes were found on the left lung, on the pleura of left side, and numerous lymph bands from the size of ordinary twine to that of half-inch rope connected the said lung to left side of chest. The right lung was diseased at its posterior margin. The marbled appearance on section ——, so characteristic of the disease in question, was beautifully demonstrated.

There are four cows on the farm that have been exposed to infection. Two cows that have the disease in chronic form. The two latter I ordered quarantined in a small stable away from all other bovine stock. The four cows that are being fatted and that were exposed as above stated, were ordered pastured away from the road or "street," as they call it. Their pastures extended along the public thoroughfare at the time of examination. Besides the above there are two oxen and about thirty-six milch cows on the farm that have not been exposed, as nearly as I could learn. I had great difficulty in gaining any information, and only by persistent effort, much strategy, and the aid of a constable was I enabled to accomplish what is herein reported. I am convinced that this is a very dangerous disease center, as the owner and those in charge have been and promise to be very derelict in their duties. And as four animals not showing disease at this time, but likely to develop it at any date in the near future, are running next the road; and as Westchester is a great dairy county, it follows that any laxity in regard to this matter jeopardizes a large interest. I am of opinion that at least two other herds in said county are also infected. I must urge, therefore, that the authorities lose no time in dealing with this question, which is positively a very grave one, affecting not merely a single individual, farm or locality, but inasmuch as the disease is contagious and fatal in a large percentage of cases, its period of incubation a long one, its progress slow in many cases,

it being very insidious and often mistaken for other diseases, and its history in this and other countries clearly proving that neglect on the part of the proper authorities to deal summarily with it has resulted in enormous losses time after time. Our dairy and live stock interests are not exceeded by any. That they should be zealously guarded is axiomatic. Every outbreak of pleuro-pneumonia is an event of national concern.

I am, sir, very respectfully yours,

EDWARD MOORE.

꞉T ON SPLENIC APOPLEXY AT FLOYD, ONEIDA COUNTY.

ALBANY, N. Y., *August* 6, 1886.

ıis BALCH, *Secretary State Board of Health:*

-On August fourth, I visited the farm of Rev. H. R. Wil- 'loyd, Oneida county, N. Y., to investigate the cause of a number of cattle on said farm, and herewith submit my

ɔer of cattle on farm July twenty-seventh, nine; females, nales, one. On July twenty-seventh a cow was taken sick l twenty-ninth; another on twenty-ninth died thirty-first; taken ill on twenty-ninth died August first; a fourth cow to be sick on August first died on the second; the fifth was found ill on August second died on the third. All similar symptoms. They were treated by a local cow who termed the disease "dry murrain." After taking state- rom the family of Mr. Williams, and the man who had the animals, I had one of the bodies exhumed and made a *tem* examination, which, in my opinion, very clearly rated that splenic apoplexy, one of the forms of anthrax was the cause of death.

ic apoplexy is very fatal, and at some seasons and under onditions is quite prevalent. A very small percentage of e amenable to treatment. Preventive measures are of nportance as pointed out to the owner. Samples of the water were taken and will be analyzed.

nimals were all on pasture and were allowed no other food. 'ater supply was taken partly from springs in the pasture, tly from a trough in the yard at milking time, the trough pplied from a spring located some distance from the pasture. ture was on high ground but contained springs which over- and rendered several acres of it wet and marshy. The e was conspicuous for its bad quality. There was an ice of weeds, decaying vegetable matter, etc., in it. A por- s covered with growing timber, and some of the wooded were swampy. In fact, everything was propitious for the nent of anthrax. It was advised that the remainder of l be quarantined in a long wide lane which was free from ns and the animals fed, as there was not much herbage in ne ounce of potassium chlorate given each animal per day . The carcasses of those dying from the disease to be not less than three feet from the surface of ground to top ss. A barrel each of charcoal and quick-lime to be put carcass, and solution of corrosive sublimate, one to four l, poured over the dead animals, and the barns to be treated s solution after thorough cleansing.

Very respectfully yours,

EDWARD MOORE.

DRAINAGE, SEWERAGE
AND
TOPOGRAPHY.

REPORT.

During the past year the demand for aid in the direction of drainage and sewerage, has been constant, and has ranged from the simple task of clearing an obstructed water-course to laying out plans for drainage and sewerage.

These requests reach the central office in various ways. Complaint is occasionally made to the board of health of a town, village or city, in regard to certain nuisances which are desired abated, to do which involves drainage or sewerage in a greater or less extent. The local board appeals for counsel, and the State board sends a trusted expert to render the necessary assistance. Sometimes complaint is made direct from the sufferers, on the ground that their local health authorities pay no attention to their appeals; sometimes they reach the office in the shape of a reference from the Governor, under section eight of the organic law of the State Board of Health. With each of these kinds of complaints the Board has had to deal during the past year.

The town of Brighton, Monroe county, through its board of health, and other citizens, appealed to the Governor to direct the State Board to examine into and report upon the defilement of Thomas creek by the city of Rochester discharging into it the contents of two outlet sewers. As the question at issue involved the settlement of a sewerage system for a large section of the city, which required time and thought; and, as on the other hand, the danger to the public health was such as to call for immediate action, a method of temporary relief was devised, pending the adoption of a more permanent remedy.

The town of Saratoga Springs was similarly suffering from the discharge of the village sewage onto the township, defiling a little brook formerly fed with storm water. After persistent pressure upon the town board of health of Saratoga Springs, it forced the sewer commissioners of the village to let a contract for carrying the sewer sufficiently far to find outlet where it would no longer cause a nuisance to the town.

The village of Fulton having obtained legislation to enable it to construct a system of sewerage and drainage, asked the counsel of the Board in the matter. The aid sought was given, and a competent engineer sent, whose report is given in the appended papers.

From residents along the course of the Piscawan creek, Troy, came an urgent appeal for relief. What had originally been a

water-course, had become, through diversion, deprived of its storm water, while the residents along its course had generally utilized it as an outlet for the sewage and general wastes of houses. Fevers and zymotic diseases generally were rife in the vicinity, and decisive action was called for. The board of health of Troy was convened and advised of the necessity of ordering a drain built for the accommodation of the people living along this line, after which the Piscawan creek should be properly cleansed and filled up. This action has been taken by the board of health of Troy, and a satisfactory adjustment of the difficulty arrived at.

At Horseheads, complaint was made of the drain built by the Superintendent of Public Works, under plans prepared by the State Board of Health. The report of Mr. Wilson shows conclusively that the work of the State was exceptionally good, and that the nuisance has been created by the village itself.

Under a law passed at the last Legislature, the abatement of a nuisance along the abandoned canal at Corning was ordered, the work to be done by the Superintendent of Public Works upon plans approved by the State Board of Health. The Superintendent prepared plans and submitted them to this Board for approval. Engineer Wilson was sent to look the ground over, and upon his report the plans were at once approved.

At Attica, a nuisance was complained of by one of its citizens, which had been the cause of disease in his family. A pure stream of water originally flowed through his property, and this had been made the convenient receptacle for the discharge of the sewage from houses higher up the stream. No properly organized board of health being in existence, appeal was made to this office. The board of health has been advised to organize, pending which it has leaked out that the party who is actually suffering from the wrongful acts of others is asked to abate nuisances created by his neighbors. The matter is now under advisement.

At Perry, a nuisance is suffered by reason of the discharge of mill wastes into Silver lake. Certain hypothetical questions were asked this Board which it was unwilling to answer without proper expert examination of the locality. The board of health of Perry, in accordance with a well-defined policy, was asked to defray this part of the expense, but as no offer has been received, the matter remains in *statu quo*.

At Southampton, a swamp nuisance was maintained through a lack of appreciation of its injurious character on the part of some. An earnst request was made for an inspection by the State Board, coupled with an offer to defray expenses. This was responded to, and the result is given hereafter.

Other nuisances requiring drainage remedies are also reported in this section.

NUISANCE IN THE TOWN OF BRIGHTON, MONROE COUNTY.

The following petitions were, on August 2, 1886, referred to the State Board of Health for action by the governor:

To Hon. DAVID B. HILL, *Governor of the State of New York:*

The undersigned residents of the town of Brighton, county of Monroe, State of New York, beg leave to call your attention to certain things which, in their judgment, constitute a nuisance affecting the health and security of the inhabitants of the town of Brighton, viz.: That running through the town of Brighton is a stream of water known as Thomas creek; that until within a few years said stream was a pure and wholesome stream of water; that since the construction of water-works in the city of Rochester, in 1876, the sewage from a large and thickly settled portion of said city is discharged into said stream, thereby polluting the same and endangering the health of the inhabitants of a portion of said town of Brighton; that the board of health of Brighton, nearly two years ago, did commence an action in the Supreme Court for the purpose of restraining the said city of Rochester from continuing said nuisance; that the court has declared the complaint established, and the relief asked for necessary, but denied the injunction asked for on the ground that the board of health had no authority to bring said action; that the discharge of excrement at the time of this trial, as estimated by Byron Holley, a member of the executive board of Rochester, was 3,654 pounds daily; that it has been and is increasing to such an extent that some remedy should be found at once; the local board of health has failed to procure the abatement of this nuisance, and that the same is, in their judgment, a proper subject for examination by the State Board of Health, under the requisition of your excellency pursuant to the act of the Legislature, known as chapter 322, Laws of 1880, section 8.

Your petitioners respectfully ask that your excellency require such examination.

Dated, *April* 22, 1886.

K. A. HUGHSON, *Supervisor*,
CHAS. H. GORHAM,
W. J. BABCOCK,
S. M. CORWIN,
JOHN E. BARNUM,
F. E. SWIFT,
WILLIAM HICKOX,
B.W. FASSETT, *Pres. Brighton Vil.*
W. A. SORNBORGER,
WM. H. JONES,
J. P. WHEELER,
BENJ'N WING,
J. D. SHELMIRE,
STEPHEN B. WING,
S. HATCH GOULD,
WM. M. PARSONS,
JAMES M. EDMUNDS,
M. D. PHILLIPS,
T. C. WILSON,
J. S. NASH,

JOHN T. CALEY,	ABRAHAM FARMEN,
JACOB LINDSAY,	DAVID WING,
THOMAS A. BROWN,	THOMAS E. BLOSSOM,
ELISHA Y. BLOSSOM,	JAMES PALMER,
A. BECKWITH,	GEO. A. WEISS,
JOHN SHIELDS,	S. WATSON,
H. A. LYON,	FREDERICK ROESOR,
JOHN D. WOLF,	PIETER BRAAL,
JOHN MILLER,	

and eighteen others.

A similar petition was forwarded from residents of Rochester, and signed by:

C. R. PARSONS, *Mayor.*	GEO. RAINES,
H. S. GREENLEAF,	W. PURCELL,
ELLWANGER & BARRY,	P. BARRY,
WM. AUG. WATER,	T. J. SULLIVAN.

STATE BOARD OF HEALTH OF NEW YORK.
ALBANY, *August* 31, 1886.

To the Hon. DAVID B. HILL, *Governor State of New York:*

SIR.—In regard to the matter of a nuisance in the town of Brighton, Monroe county, caused by the city of Rochester emptying a part of its sewage into a stream known as Thomas creek, running through the said town, and a nuisance being thereby created dangerous to the public health, the matter having been referred by your excellency to this office for such action as might be called for under section 8, chapter 322, Laws 1880, I have the honor, by direction of the State Board of Health, to report as follows:

On Wednesday, August eighteenth, I visited Rochester and, in company with Dr. E. M. Moore, President of the State Board of Health, and Mr. Carman, the Assistant Secretary, met with the Mayor of Rochester, the Hon. C. R. Parsons, and Mr. Emil Kuichling, C. E., a member of the Executive Board of the city, on the part of the city, and Hon. Walter Hubbell, counsel; Messrs. K. A. Hughson, Supervisor; E. Lyon, W. W. Chapin, Benjamin Wing and others, representing the town of Brighton.

After hearing statements as to the nature of the nuisance complained of, in the afternoon of the same day, in company with Messrs. Kuichling, Chapin, Chapman, Lyon, Hughson, Hubbell and Carman, I visited the localities where the nuisance existed.

On Monroe avenue, at a place called Nichols Park, the sewer opens into an open ditch which runs in a curved direction southeasterly about a quarter of a mile, where it empties into Thomas creek, thence running about three-quarters of a mile in a direction a little south of east, alongside of the Erie canal, and from there,

turning north-east, the stream goes about a short half mile to the New York Central Railroad, and from there, following a winding course, generally north-east, the stream runs about a mile and a-half in a straight line to the point where it empties into Irondequoit bay.

Before crossing under the New York Central Railroad it flows through two ponds, one on the place of Mr. Chapin and the other owned by Mr. Chapman. Beyond the railroad it enters a glen, in which is another pond owned by a Mr. Palmer. Where the stream crosses the railroad it is joined by a ditch alongside the embankment, which ditch carries the sewage emptied into it at a point about one-half a mile north-west, from the sewers of East and Park avenues.

For the whole course of the ditches and stream, from where the sewers discharge into them to the pond on Mr. Palmer's land, the presence of raw sewage could be distinctly seen and foul odors and gases were present. The ponds on Mr. Chapin's, Mr. Chapman's and Mr. Palmer's land have become large cess-pools of raw sewage, covered more or less with a heavy, thick scum. Mr. Chapin's pond is a natural hollow in rock, seven feet deep, and was only ornamental. It is within fifty feet of the house, which had to be abandoned on account of the odors. The pond is about seven feet deep, and is now a cess-pool filled with raw sewage. Mr. Chapman, whose pond is much larger, used to cut and sell ice therefrom. It is now in the same condition as that of Mr. Chapin. Mr. Palmer's pond was used for mill power, but the mill has had to be abandoned, the pond being but a cesspool, and at the time of visitation entirely covered with a heavy green scum, hiding the water completely.

The board of health of Brighton brought an action against the city of Rochester, to compel the city to abate the nuisance. The decision of the Supreme Court, Mr. Justice Rumsey, found as a question of fact "that the constant flow of sewage through said town into Thomas creek, and down said creek, across the town of Brighton, has polluted the waters of said creek, and rendered them filthy and unwholesome, and caused it to emit foul and unwholesome odors, and that such sewage is largely deposited on the banks of said creek, and by reason thereof the waters and the bed thereof have become unwholesome and dangerous to the public health, and that such condition of affairs existed before the 1st day of August, 1884," and as a question of law, "that the said plaintiffs, as a board of health, have no power or authority to pass or make any orders or regulations for the suppression or removal of any nuisances created by the city of Rochester, within the limits of said city." The honorable justice supported appeal to your excellency for action under the law of 1880.

The decision quoted above was affirmed in General Term, January, 1886, and is now before the Court of Appeals.

There is no question as to the existence of a nuisance, dangerous and threatening to the public health, and one that needs prompt and efficient measures for its relief. The condition of the ditches, streams and ponds is such as to require immediate attention. Sickness has already been created by this insanitary state, and more may be expected.

To fully and permanently remedy the present condition of Thomas creek is a problem requiring much study and calculation. It will entail a plan of sewerage and intercepting sewers, with plans for sewage disposal, which cannot, in justice to the city of Rochester, be hastily decided upon. Temporary relief may, however, be had at but comparatively small expense and in a fairly short time.

I respectfully request your excellency's attention to the inclosed map. Marked in red, are the sewers in Park and East avenues, joined together by a sewer in Culver street, which empties into the railroad ditch at "C." The ditch then runs south-east to "D" where it joins Thomas creek. If at "A" where Thomas creek crosses Culver street alongside of the Erie canal, a drain be made to connect with the drain at the end of Park avenue, it will relieve Thomas creek of all the sewage from Monroe avenue sewer, and transfer that to the railroad ditch at "C." To relieve the condition of Thomas creek after this combined sewage from Monroe, Park and East avenues enters into it, disinfection could be had by means of manganate of soda and sulphuric acid which would deodorize the sewage and render it less harmful than at present.

This plan would take away the sewage from Messrs. Chapin and Chapman's ponds, which could be cleaned out, and the stream allowed to resume its original bed through them, as the water will still be more or less impure from surface washings, and should not be used for potable or culinary usages, nor should ice be cut from it. Mr. Palmer's pond (not shown on the map) could also be allowed to run off, the dam being open for such purpose. The city of Rochester could purchase of Mr. Palmer his water right until such time as permanent drainage could be established.

This plan was submitted to both parties and agreed to as the best remedy that could be had for the present. Measures looking to permanent relief should be at once taken by the city of Rochester.

It is, therefore, respectfully recommended for your excellency's approval and order:

I. That the city of Rochester construct a drain, of twelve inch vitrified drain tile from Thomas creek where it crosses Culver street near the Erie canal, to the drain already laid in said street and Park avenue, for the purpose of receiving into said Culver street drain all the sewage now emptied by the Monroe avenue sewer into Thomas creek.

II. That no other sewers or drains be allowed to discharge their contents into Thomas creek at any point between the point of crossing of said creek of Culver street near the Erie canal, and the tracks of the New York Central and Hudson River Railroad.

III. That proper works be erected for the purpose of disinfecting the sewage, as near the discharge pipe of the Culver street drain at the New York Central and Hudson River Railroad tracks as may be practical.

IV. That the city of Rochester employ suitable person or persons for the express purpose of preparing some plan or plans by which permanent and proper drainage may be had for the city, and plan or plans for the proper disposal of the sewage, and that this action on the part of said city be taken immediately.

V. That if it is considered best, in order to insure the rapid and more thorough completion of such work, the said permanent drainage of the city, that the Legislature be asked to pass such law or laws as may be necessary to create a commission, to be known as the commission on drainage, said commission to have all necessary powers granted to it that may be called for in the prosecution of the work.

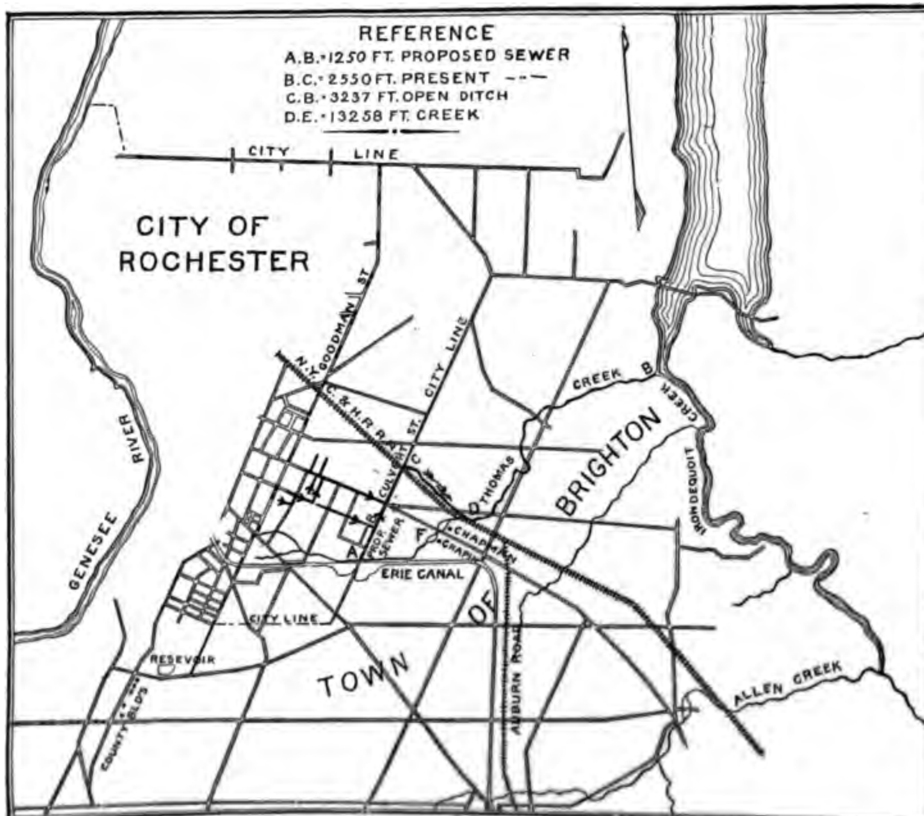
VI. That the board of health of Brighton be directed to cause the ponds on the property of Mr. Chapin and Mr. Chapman to be cleaned, the dams to be opened, that Thomas creek may resume its natural channel. And that the same be done to the pond on the property of Mr. Palmer.

I have the honor to remain, sir,

Your obedient servant to command,

LEWIS BALCH,

Secretary State Board of Health.


REFERENCE
A.B.=1250 FT. PROPOSED SEWER
B.C.=2550 FT. PRESENT
C.B.=3237 FT. OPEN DITCH
D.E.=13258 FT. CREEK
CITY LINE
CITY OF ROCHESTER
GOODMAN ST.
N.Y.C. & H.R.R.R.
CITY LINE
CULVERT ST.
PROP. SEWER
THOMAS
CHAPMAN
CHAPIN
ERIE CANAL
CITY LINE
RESEVOIR
COUNTY BLD'S
GENESEE RIVER
TOWN OF BRIGHTON
AUBURN ROAD
CREEK
IRONDEQUOIT CREEK
ALLEN CREEK
A
B
C
D
F

STATE OF NEW YORK,
EXECUTIVE CHAMBER.

To whom it may concern :

Whereas, A complaint having been made to me of the existence of a nuisance in the town of Brighton, county of Monroe, caused by the emptying by the city of Rochester of a part of its sewage into a stream known as Thomas creek, running through said town of Brighton, and which complaint was by me referred to the State Board of Health, pursuant to law; and

Whereas, The State Board of Health having found and certified that the matters and things as complained to exist, and having declared the same to be a public nuisance, dangerous to the public health;

Now, therefore, It is hereby ordered that the mayor and common council of the city of Rochester do or cause to have done without delay, the things following, to wit:

I. To construct a drain of twelve (12) inch vitrified drain tile from Thomas creek where it crosses Culver street near the Erie canal, to the drain already laid in said street and Park avenue, for the purpose of receiving into said Culver street drain all the sewage now emptied by the Monroe avenue sewer into Thomas creek.

II. To provide that no other sewers or drains be allowed to discharge their contents into Thomas creek at any point between the point of crossing of said creek at Culver street, near the Erie canal, and the tracks of the New York Central and Hudson River Railroad.

III. To provide proper measures for the purpose of disinfecting the sewage as near the discharge pipe of the Culver street drain at the New York Central and Hudson River Railroad tracks as may be practicable.

It is hereby further ordered that the board of health of the town of Brighton cause, without delay, the ponds on the properties of Mr. Chapin and Mr. Chapman to be cleaned and the dams to be opened that Thomas creek may resume its natural channel, and that the same be done with the pond on the property of Mr. Palmer.

Given under my hand and the privy seal of the State, at the Capitol, in the city of Albany, this 20th day of [L. S.] September, in the year of our Lord one thousand eight hundred and eighty-six.

DAVID B. HILL.

By the Governor.

WILLIAM G. RICE,
Private Secretary

SEWERAGE NUISANCE, GREENE, CHENANGO COUNTY.

LEWIS BALCH, M. D., *Secretary State Board of Health, of New York, Capitol, Albany, N. Y:*

SIR.— Under your direction, and in accordance with the request of J. M. Johnson, M. D., health officer of the village and town of Greene, Chenango county, New York, I have made a careful examination of the village of Greene and of its environment, and have now the honor to submit thereon the following

REPORT.

The village of Greene, Chenango county, New York, lies upon a bed of gravel of an average thickness of about six feet, and overlying a bed of hard blue clay of unknown thickness. The entire drainage of the village is conducted into privy pits, cesspools, etc., all dug in the gravel. The Chenango river flows through the eastern part of the village, having an approximate north and south course. At a point indicated on the map accompanying this report there is a dam about five feet high that sets the water back for a distance of nearly two miles. At the time of my visit the water above the dam had no appreciable current. The water supply is at present chiefly obtained from two small reservoirs located on the hillside west of the village and maintained at private cost. There are also several wells in use, and formerely the entire supply was obtained from this source. The ground in the village is almost honey-combed with privy-pits, both old and recent; the custom having prevailed to a large extent of using a pit until full and then moving the privy structure over a new hole dug in the ground, and covering over the old one. This process has been carried on to such an extent that in some places over fifty per cent of the yard area is thus occupied. This condition is necessarily dangerous to health and renders the water drawn from the gravel very suspicious, to say the least. In a verbal report to the trustees of the village the adoption of a system of sewerage was urged, and, in the spirit of the letter of instructions from the secretary of the State Board of Health to the health officer of Greene, I recommended that, in the event of its being impracticable, to completely sewer the village at present, whatever work should be done now might be carried out as a part of a general *system of sewers.* By actual leveling I determined the (approximate) absolute grades of all the streets and the elevation of all street intersections, and upon these and other data designed the system shown in the map appended to this report. The board of trustees of the village, deeming the matter urgent, decided to go on and construct a part of the system, viz.: The

sewer in Genesee street, Monell street and thence to the outfall. I venture to recommend to the State Board of Health that this procedure be approved.

THE SYSTEM.

I respectfully recommend the separate system, using small vitrified tile for the sewage proper and conducting storm water on the surface in gutters. In proportioning the sizes of pipes, regard has been had not only to present requirements of population, but also to the direction and magnitude of growth of the place. In the matter of apportioning the expense of construction, the following plan was suggested to the Trustees upon request of one of the Board:

First. The property on both sides of a given street to pay the cost of a sewer just sufficient for that street considered as independent of the system.

Second. The corporation to be charged with difference in cost between the sewer as described in (1) and the sewer actually required as part of the system.

Third. The cost of the out-fall and connection to be borne by the corporation.

This plan is certainly open to some criticism, but is believed to be approximately fair, and is certainly simple. A man-hole is to be constructed at nearly every change of direction. (Drawing and description of man-hole are appended.) An automatic flush-tank (Field's), discharging from fifty to 100 gallons, according to location, is to be placed at each important "dead-end." On the map the man-holes are designated by double circles and the flush-tanks by single circles.

SEWAGE DISPOSAL.

As a general rule, sewage should not be discharged into a river; still there are circumstances that so modify this rule as to practically reverse it, and such, I believe, to be the case at Greene. The place is so small (1,200 inhabitants) that the sewage will be enormously diluted in the Chenango river, even during the summer season when the water is at its lowest level, and although it would, in spite of this dilution, pollute the water enough to render it unfit for general drinking purposes, yet, on the other hand, the river is not used as a source of drinking anywhere between Norwich and Binghamton, where it joins the Susquehanna river. Again, any system of chemical or mechanical treatment would require a pumping plant, together with receiving and settling basins, or tanks, the whole representing an outlay of money that would effectually and indefinitely postpone the introduction of any system of sewers in the place. For these and other reasons I respectfully submit that the only feasible method of disposing of the sewage is to conduct it into the Chenango river below the dam, and below the usual bar formed by the dam, that is as shown on the appended map.

In concluding this part of the report, I respectfully recommend that the trustees of Greene, Chenango county, N. Y., be advised to adopt the system of sewers, man-holes and flush-tanks as herein set forth and as represented on accompanying map, and that they be advised to *require* that the old cesspools and privy-pits be cleaned out and filled with fresh, clean earth as fast as the sewers are extended through the districts where the cesspools, etc., are found.

INSPECTION OF SCHOOL BUILDINGS.

In accordance with the request of the Health Officer, I made an inspection of the two school buildings in Greene and found the following state of affairs: There are two school buildings, standing side by side on Monell street, one of which is an old building occupied by the intermediate and grammar departments, and the other a new building occupied by the primary department. Both are frame buildings. The grounds, although rather small, are very pleasantly situated on the banks of the river. The following table gives the principal numerical data of both schools:

DATA.	Primary room No. 1. (Fig. 1.)	Primary room No. 2. (Fig. 2.)	Grammar room (Fig. 3.)	Intermediate. (Fig. 4.)
Dimensions of room	17⅛ ft. x 27¼ ft. x 10 ft.	21 ft. 5 in. x 27¼ ft. x 10 ft.	29¼ ft. x 39 7-12 ft. x 10 5-6 ft.	29¼ ft. x 38 7-12 ft. x 10 5-6 ft.
Number of pupils	36	50	64	63
Floor area	470 square feet	588.6 square ft.	1155.6 sq. ft.	1091.2 sq. feet.
Volume of air per pupil	130 cubic feet.	117 cubic feet.	194.9 cubic ft.	187.4 square ft.
Floor area per pupil	13 square feet.	11.7 square ft.	18 square feet.	17.3 square ft.
Glass area	72 square feet.	72 square feet.	105.6 square ft.	105.6 square ft.
Ratio of glass to floor	1:6	1:8.1.	1:10.3.	1:10
Size of window	3 ft. x 6 ft.	3 ft. x 6 ft.	3¼ ft. x 6⅛ ft.	3¼ ft x 6⅛ ft.
Top of window to ceiling	15 inches.	15 inches.	12 inches.	12 inches.
Heated by	Heater.	Heater.	Stove.	Stove.
Ventilators, number and locat'n	1; floor.	1; floor.	2; ceiling.	1; ceiling.
Size of ventilator	6 in. x 10 in.	6 in. x 10 in.	12 in. x 15 in.	12 in x 15 in.
Air changes once in *	2.12 hours.	2.6 hours.	1.15 hours.†	1.09 hours.

* Velocity assumed, 2.5 feet per second. † If both ventilators are equally efficient; probably one only is operative at any one time, making the changes of air once in 2.3 hours.

The accepted standards regarding the above (derived) data are as follows:

Volume of air per pupil	210 cu. ft.
Floor area per pupil	15 sq. ft.
Ratio of glass to floor	1:5

PRIMARY SCHOOL (new) ROOM 1 (Fig. 1).

As will be seen from the plan (Fig. 1), the arrangement of the windows in this room is very faulty, by reason of the cross lights. The table shows that the amount of light is a little deficient, even regarding all the windows as equally efficient; while, as a matter of fact, one of the rear windows is but a few feet from an unpainted

shed or barn, which of course cuts off the greater part of the light otherwise entering by this opening.

The hot air and ventilating registers are properly placed for ventilation, although greater efficiency would result if the hot air register were in the side wall near the ceiling. The ventilating register is absurdly small, as is the flue; this latter is built alongside the smoke flue from the furnace. In fact, the ventilating apparatus is an excellent system *in miniature*, but quite incapable of serving the purpose for which it was designed. In calculating the work of the apparatus I have taken six-tenths of the nominal aperture of the register for the actual aperture, and have taken fifty per cent of the velocity due to the light and probable temperature of the flue — the loss being due to friction (the inside of the flue is rough and rectangular in section, and exhibits one right-angled bend).

The floor area is eighty-seven per cent of the minimum standard allowed by the great majority of sanitary experts, while the volume of air per pupil is but sixty-two per cent of what is required. This condition, taken in connection with the insufficiency of the ventilating apparatus, is decidedly unfortunate, since, in order to keep the air free from annoying odor, recourse must be had to opening windows — a fruitful source of "colds," with their disagreeable and sometimes serious sequels.

PRIMARY, ROOM 2 (Fig. 2).

The same amount of light is furnished this room as the one just described, although it is considerably larger. The amount of window surface is 61.7 per cent of what is required. The arrangement of windows is practically the same as in No. 1, and, of course, equally faulty.

The heating and ventilating apparatus is precisely the same as in No. 1.

The floor area is 78.5 per cent of the standard, and the volume of air per pupil is but 55.7 per cent of the standard.

It is greatly to be regretted that in constructing this new building the architect's plans were not submitted to some competent sanitary authority, who would have suggested such changes as would make the greater part of this report unnecessary — changes, too, that would not have considerably increased the cost of construction. Very little can be done now to better this building. I would respectfully suggest that the shed, or barn, referred to as obstructing the light in room 1, be acquired and torn down, or else removed. The little registers to the ventilating flues might advantageously be removed and larger ones inserted. The teachers in each room will, however, have to flush the room at recess, before and after school by opening windows wide.

GRAMMAR DEPARTMENT (Fig. 3).

This is an old building, rather dilapidated and but poorly answering the modern requirements of a school. The arrangement of windows in this room is very good indeed, but the amount of glass surface is sadly deficient, being but 48.5 per cent of the standard.

The room is heated by one large stove placed in a corner, and within a little less than three feet of the nearest desk. In the ceiling there are two rectangular openings, without registers, opening into the general space above. I think it probable that, if both of these openings be open, a current of air will rise through the one nearest the stove and that a current of cool air will descend through the other one. In any event, since there is no provision for admitting fresh air, and since the ventilators (?) do not communicate with the outer air, there is really no ventilation at all, and the sole effect of the openings is to diminish the heating effect of the stove.

The floor area is greater than is required, but this is not a fault. The ceiling, however, is so low that the volume of air per pupil is but 92.8 per cent of the standard.

INTERMEDIATE DEPARTMENT (Fig. 4).

This room is in the same building with that last discussed. The arrangement of windows, while not quite as good as in the grammar room, is very fair and hardly open to criticism. As in the last room so here, the amount of window surface is very much less than it should be — just one-halt of the standard.

The heating and ventilating appliances are the same as in the grammar room.

The floor area is ample and the volume ot air per pupil 89.2 per cent of the standard.

This old building may be repaired, without serious expense, so as to be, sanitarily considered, in excellent condition. Æsthetically, the structure is very ugly whether viewed from without or within, and the changes now to be suggested will not improve it in this respect.

I respectfully suggest that the trustees be advised to cut in three more windows for each room; to put in a large furnace, with ample cold air duct, and delivering hot air into the rooms about eight feet above the floor; to take the hot air pipes through galvanized iron ventilating flues (projecting, necessarily, into the rooms) extending from floor to and at least six feet above roof, with register at lowest point. The dimensions of furnace, ducts and register to be properly proportioned to the rooms. At a somewhat increased expense, steam heat might be substituted for the hot air furnace with much more satisfactory results.

PRIVIES.

The new school (Primary) has two ordinary privies *in a wing of the school building*, and the old building has two detached privies. I have no hesitation in pronouncing these as nuisances. As the village proposes to lay a sewer through the street on which the schools front, it will be practicable in a very short time to introduce a water carriage system for the removal of excreta from the schools. Accordingly, I respectfully recommend, that the trustees be advised to set up in each school building two latrine sections, with automatic supply, one tank serving each pair of sections. Also, that the rooms in which these latrines are placed, be heated by a stove and be well ventilated.

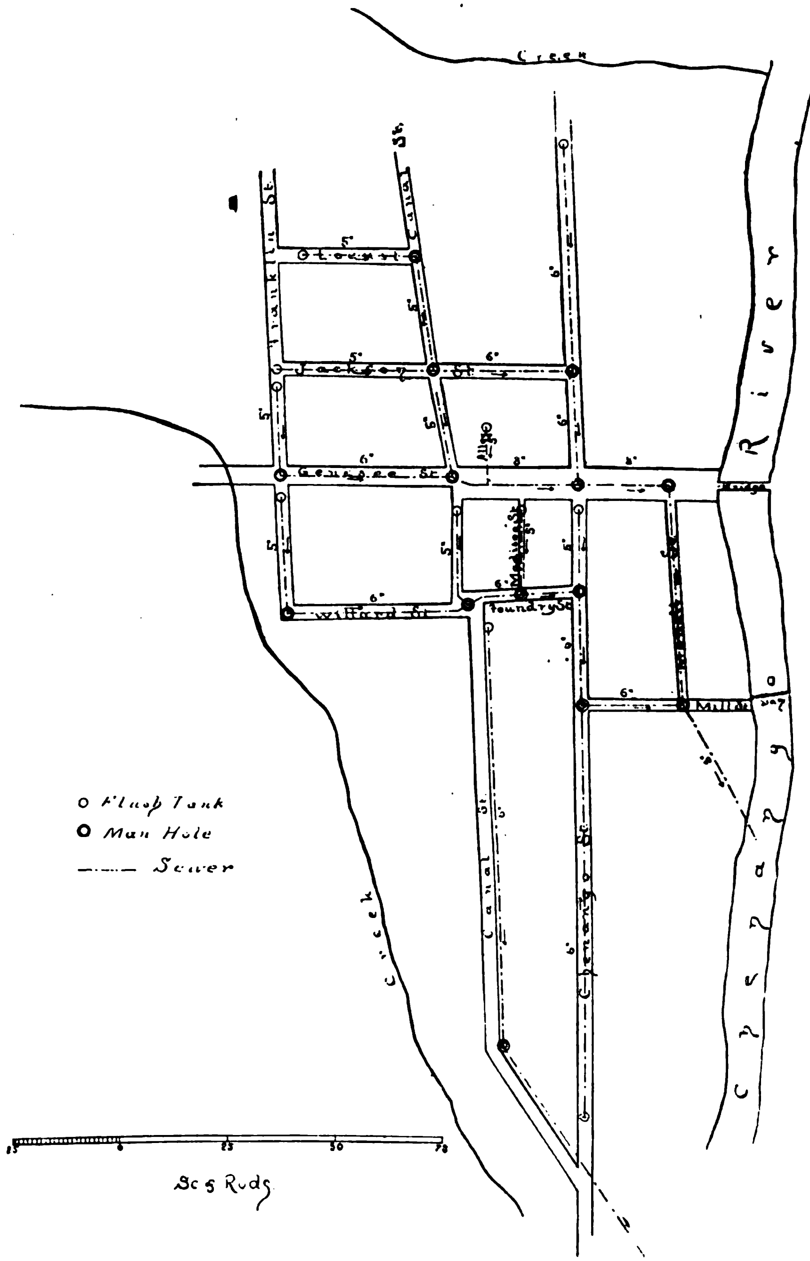
SLAUGHTER-HOUSE NUISANCES.

I take the liberty of including in this report a reference to a nuisance of great magnitude — an extremely filthy slaughter-house standing close to the public highway and well within the corporation. All of the offal and refuse are thrown into a yard back of the slaughter-house itself, and is there partly devoured by a number of hogs — and all this in plain sight from the roads. The health officer is very desirous of abating this nuisance, but can not do so without the authority of the State Board of Health. I certainly urge that the State Board of Health take at once whatever action is required in this matter.

All of which is respectfully submitted,

RICHARD PRESCOTT, M. E.,
Sanitary Engineer.

ALBANY, N. Y., *September* 22, 1886.


Creek
River
Franklin St.
Canal St.
Locust St.
Jackson St.
Genesee St.
Willard St.
Foundry St.
Mill St.
Chenango St.
Bridge
Flush Tank
Man Hole
Sewer
25
50
75
Sc 5 Rods

REPORT ON THE SEWERAGE OF THE VILLAGE OF FULTON.

LEWIS BALCH, M. D., *Secretary State Board of Health:*

SIR.— About the twentieth of May, the trustees of the village of Fulton applied to the State Board of Health for advice and assistance in the matter of securing a plan for the sewerage of the village, which would meet all the modern requirements of sanitary science; the expense of the examination and plan to be born by the village itself. On recommendation from the State Board, the trustees, through one of their most energetic members, Dr. Daniel Pardee, sent for me to make a preliminary examination and report on the cost of a plan for sewerage. I found Dr. Pardee, village trustee and health officer, deeply interested in the question of the sanitary improvement of the place, and in company with him I went over the ground, and afterwards made such preliminary levelings as were necessary to decide on the practicability of certain sewerage lines. The village is beautifully situated on the slopes and end of a ridge, lying parallel with the Oswego river. The natural drainage of the surface is quite perfect, but in places the springy soil produces wet cellars. The filth of the village has heretofore been disposed of in cess-pools, saturating the soil about the houses, but since the introduction of a plentiful water supply the evils of this method of sewage disposal, as well as its inconveniences, are felt by an increasing number of the people, and the demand for good sewage for the disposal of all polluted waste waters already exists on many principal streets of the village. In some of the streets, however, the people are not yet sufficiently acquainted with the advantages of good drainage to desire it. As no difficulty is experienced now from storm water, nature having provided every means for its disposal, it would be extravagant and useless to plan sewers for carrying off the rainfall. Such sewers being very difficult to keep in a sanitary condition. The evils from which the village is suffering being merely wet cellars and sewage accumulation, it is evident that the separate system was best applicable to the wants of Fulton. And I advised the board of trustees that a system of small pipe sewers, made of the best salt-glazed vitrified pipe, and adapted in size to carrying the sewage and excesses of subsoil water, would best answer their sanitary and economic purposes. The outlines of a plan were sketched, of which the two mains would be only from ten to twelve inches in diameter, while the branches need not exceed six.

The question of an outlet was complicated somewhat, by passage under the canal and by finding a point in the river where the sewage could be discharged without causing any nuisance in the time of very low water. After two days investigation of the con-

ditions, a meeting of the board of trustees and of prominent citizens was held, at which I explained the nature of their sanitary difficulties and of the method of sewerage which was best adapted to remedy them. By a vote of the board I was requested to prepare detailed plans and estimates for the construction of a system of sewerage which should include the greater part of the village, but the branches of which could be built on each street as the demand came from the property owners. It has heretofore been the practice in the villages of the State, when a sewer was demanded by the property owners on a certain street, to build a sewer to satisfy the wants of the applicants, but without any reference to the future needs of other streets The result has been when other streets that also needed sewering, and which should naturally have drained into the first sewered street, decided to build their sewers, that neither the grades nor the size of the first sewer were adapted for receiving sewage from other parts of the village, and much sewerage has had to be duplicated, and much has remained undone on account of this want of relation between the sewers of one street and the sewers which should be built in others. For this reason I advised the trustees of the village of Fulton to have a plan to begin with, each member of which would be properly related to every other part, so that when the whole was built it should work together with economy and effectiveness. On this advice they acted, and I prepared for them complete plans, drawings and specifications, for the sewerage of the village by the separate system equipped with sufficient tanks, main-holes, handholes, lamp-holes, etc. On streets where there are wet cellars the plan provides for agricultural drain tile, laid on both sides of the sewer, with branches running in the same trench with the house sewer to the foundation of the houses where this is necessary. The average cost of the system, including mains and outlet, is not likely to exceed eighty cents a foot. The plan is now before the people for consideration, and Dr. Pardee, the health officer, writes that the friends of sanitary improvement in the village hope to secure its construction during the coming spring. There is the usual amount of opposition from those who do not realize the importance, or are unwilling to pay for promoting thorough cleanliness and healthfulness in the village, but many of the leading citizens seem so determined to secure the proper sewerage of Fulton that there is little doubt that opposition will be overcome.

Before closing this report of my proceedings I should, perhaps, mention a question that was raised regarding the propriety of disposing of the sewage in Oswego river for the reason that some ten miles further down the stream the city of Oswego uses the water for its public supply. I decided that considering the amount of sewage which is being poured into the larger streams of this State it would, perhaps, be unwarranted to put a serious obstacle in the way of the sewering of Fulton by preventing the use of the

Oswego river as an outlet unless the liability to pollute the Oswego water supply was really serious. The fact is that the fall from Fulton to Oswego is quite large. That the river descends over a series of rapids in the ten miles below Fulton; that it falls over two dams, and that between the rapids and dams are long, still reaches adapted to settling out heavy impurities in the stream. The volume of the river is large, the amount of sewage which will enter at Fulton is small. It is most probable, in fact I think certain, that the oxidation taking place in the rapids and the sedimentation in the still reaches of the river will purify the water so that no contamination of the stream will occur at the point where it is taken by Oswego for its public supply. Should the time ever come when a general law is enacted against the turning of crude sewage into any parts of any stream which are used as public water supply, it will then be possible to purify the sewage of Fulton; but I feel that the State Board or their representative would not be justified in laying down for the village of Fulton a rule of action which is not observed in any other part of the State.

Very respectfully yours,

JAMES T. GARDINER,
Consulting Engineer.

The above report was approved by the State Board of Health.

LEWIS BALCH,
Secretary.

REPORT OF THE SANITARY CONDITION AND SEWERAGE OF HOOSICK FALLS.

LEWIS BALCH, M. D., *Secretary of the State Board of Health:*

SIR.— The village of Hoosic Falls in 1884, applied to the State Board of Health for an examination of an alleged nuisance caused by the condition of a brook which runs through the heart of the town. Mr. Horace Andrews, C. E., made the inspection and found the brook a mere open sewer lined with filth, from house drains which enter at many points along its course, defiling the brook with the sewage of a large population. The region along this water-course is thickly settled, and several of the churches and principal residences lie within two or three hundred feet of the water-course. The filthy condition of the brook seriously endangered the public health. The foulness of the deposit was such that directly after the inspection when an attempt was made to clean the channel the man who did the work died within a day or two, from a disease closely resembling cholera. A plan for remedy proposed in the village was to lay a sewer pipe under the bed of this brook, and connect all the drains with this sewer. Mr. Andrews gave it as his opinion, that this plan was practicable, provided that a large flush tank was placed at the head of the sewer to keep it constantly flushed. Last winter a law was passed authorizing the board of trustees to build sewers on the application of a sufficient number of property owners along any street or along the brook channel. It was understood in the village that the State Board of Health had approved of the plan of laying the sewer in the brook bed. During a visit to Hoosick Falls I was called upon with regard to the matter by the president of the village, Mr. Willard P. Parsons and some of the principal citizens, several of whom did not consider the laying of a sewer in the channel of the brook as a practicable scheme. I stated to those gentlemen that a reference to the report of the State Board of Health would show them that while the Board condemned the condition of the brook as a nuisance detrimental to health and dangerous to life, and admitted the practicability of the remedy by laying a sewer in the brook channel, yet that it was distinctly stated that a much better remedy would be a general sewerage system for the whole village. I was asked to make a reconnoissance of the ground, which I did in company with the president of the village, and after considering the matter I informed them that the State Board of Health would not indorse or support the laying of a sewer in the channel of the brook as an efficient remedy for the sanitary evils arising in Hoosick Falls from want of proper drainage. Such a sewer would be expensive to lay. It would be under water through much of the year, therefore difficult to reach for the purpose of making connections.

It would only accommodate the drainage of a small part of the village, and it would empty into the Hoosick river on the shallow side of a mill pond close to a settled part of the village where the discharge of the sewer was likely to create a nuisance in time of low water, when in the shallower parts of the pond the bottom is often exposed throughout a large part of the day. The trustees of the village met and I explained to them these facts and the importance of having a plan for the sewerage of the whole village which could be carried out by the Board as desired by different localities and streets, a number of streets having applied to have sewers built. Should the trustees build sewers on these isolated streets which have no reference to one another in carrying capacity or in grade, the result in the end would be most unsatisfactory both in a sanitary and economic point of view. I informed them that the State Board of Health invariably recommended in such cases that the village have made a well considered plan for the sewerage of the whole village so that when the trustees were called upon to build a sewer in any given street, it could be built with reference to all the branches and connections which would afterward be made. In other words, that each part would be so related to the whole that the most effective and economical drainage would be accomplished by it when the whole was built. The trustees then voted to have a plan made for the sewerage of the whole village and desired me to undertake the work. The surveys and plans are now nearly completed. No difficulties arise in Hoosick Falls from excessive accumulations of storm water and in only limited localities are wet cellars common. The principal difficulty is in disposing of the sewage. In walking along the brook during the month of September I found the stench from it almost intolerable and that it pervaded the whole neighborhood. It is really remarkable that no serious epidemic has broken out in Hoosick Falls through the part of the village where the brook runs. Certainly a worse nuisance is hardly to be found in the State of New York than the condition of this brook after a long dry period in summer, when the filth of a large population has been poured into it and when the amount of water running into the channel is too small to cleanse the water course. It can only be a question of time when serious evils will result if this condition of things is not remedied. In other parts of the village where there is clay soil and cesspools do not work well, the slop and wash-water from the houses is poured into the gutters where filthy and offensive accumulations necessarily take place. There being no necessity for providing for storm-water in the sewers, it was clearly a case where the separate system of small pipe sewers, thoroughly flushed with automatic flush tanks would answer every purpose and be much the most economical. After examining low water conditions of Hoosick river, a point at the foot of the rapids below the dam, in a large pool was found where no nuisance would be created by the discharge of the sewage.

The population of Hoosick Falls has grown rapidly within the last six years, and a large part of the village is so thickly populated that the greater number of streets require sewerage immediately and are able to pay the small assessment which would be necessary for constructing a system of sewers on a separate system. Since the whole village is interested in the health of every part, and since the introduction of a plentiful water supply has rendered cesspools doubly dangerous in this village, I think it would be greatly to the advantage of the public health if the trustees of the village were empowered to construct sewers throughout such part of the village as they deemed necessary without waiting for the action of the property holders on each particular street. It will require the building of sewers on a number of streets to thoroughly relieve the existing nuisance of the brook and of the filthy gutters. The president of the village has requested me to bring this matter before the State Board of Health, and ask for a formal expression of its views with reference to the necessity of a system of sewerage for the whole of the populous part of the village. I recommend that the board again declare that the use as an open sewer of the brook through the central part of the village of Hoosick Falls, creates a nuisance endangering the life and health of a large number of people; that the use of the gutters as receptacles of foul house wastes is also dangerous to the public health; and that cesspools in the thickly populated part of the village are not a proper means of disposing of the sewage of the village; and further that the best remedy for the existing unsanitary condition is a complete system of sewerage for the whole village.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

The above report was approved by the State Board of Health.

LEWIS BALCH,

Secretary.

REPORT ON THE SANITARY INSPECTION AND IMPROVEMENT OF THE RENSSELAER COUNTY POOR-HOUSE, NEAR TROY.

To LEWIS BALCH, M. D.,

Secretary of the State Board of Health:

SIR.— The Board of Supervisors of Rensselaer county having in May last requested the Secretary of the State Board of Health, to send the consulting engineer of the Board at the expense of the county to examine the sanitary condition of the poor-house, near Troy, I made the first examination within a few days of the receipt of the application.

I found that early in the spring two of the children of the keeper had died from what apparently was a complication of diphtheria and pneumonia; that the wife of the keeper, after recovering from the birth of a child, sunk rapidly in strength so as to be in imminent danger; that a third child of the keeper had been seriously ill with symptoms of combined diphtheria and pneumonia, and that the clerk had been prostrated with typhoid fever, and although the fever passed away in the usual period, the strength of the patient did not return. All these cases of marked filth diseases occurring about the same period in that portion of the poor-house occupied as the keeper's quarters, caused the physicians attending and in consultation to declare that some sewage poison must be reaching the inmates of the building. My examination showed that the drains in the house were leaking at almost every joint. In two places, one in the hospital and one under the main building, the covers of the hand-holes or traps were entirely gone. The drain under the cellar floor of the keeper's quarters was a tile drain practically laid without cement. The ground about it was saturated with filth. In the bath room adjoining where the children slept, the plumbing was in a most leaky and unsafe condition. There was no system of ventilating the house drains whatever, nor were they properly trapped. From innumerable leaks and openings the sewer air was pouring into the keeper's quarters, into cellars, and into the hospitals. The drains under the floor of the cellars, of the meat room in the cellar, of the bakery, and under the laundry were surrounded with filth oozing through the joints of the drain. There was every evidence that the sewage was constantly backing up in the drains and forcing itself out through every leaky joint. This wretched system of house drains emptied into a four-foot brick sewer which runs 1,200 feet to the west, and there emptied itself into a little water-course. There was no difficulty in ascertaining the quantity of water used in the building and discharged through the sewers; there are no leaders to the

roofs, and therefore no roof water entered into the question. Only such water passed through the sewers and was received through the city supply, and this was daily measured with a metre. Water enough was used to fill the four foot sewer one to two inches deep, depending upon the time of day. The sewer was laid so that in places the top was hardly below the average level of the ground. The result was that it was thrown into waves by settlement and action of frost so as to be utterly unfit for the discharge of the sewage. All this was evident without opening the sewer by simply probing down to the top of the arch. The profile thus obtained showed that the structure would no longer carry sewage without the creation of a large deposit of filth in the bottom. Had the sewer been open it is probable that stoppages from fallen brick or soil might have also been found. They flushed the sewer that I might see the result, and I found a large amount of solid material brought to the lower end in all stages of decomposition, and most offensive in its odor. I was informed by the superintendent, Mr. Dunham, that unless the sewer was constantly flushed, the sewage would be dammed up and set back, filling all the drains, and oozing out into the rooms, as above described. The semi-putrid sewage discharged from this sewer deposited its solids in the first few hundred feet as it traversed the little water-course; while that large part which had been taken into solution flowed on with the water through the adjoining field emptying at last over a cliff into a quarry and running on into the city of Troy, where at last it reached a sewer. After the deposition of the solid parts of the sewage, the stream looked as clear as any of the brooks of that region. At the time of my second visit a large number of boys and young men were playing ball in the field through which the little sewage brook flowed, and when thirsty were drinking from it. In the quarry I saw two men drink from this brook. Of course, none of these people had any knowledge of the filthy source from which it came. In addition to these difficulties with the house drain, the main sewer and the methods of sewage disposal, I found that the system of ventilation originally planned for the building had been left in a most shamefully incomplete manner, so as to be utterly ineffective. Brick ventilating flues had been provided for every one of the rooms. These flues ran up the central walls in stacks, and instead of being carried to the roof were left to open into the attic. But even here their purpose had been entirely overlooked, and their tops had been covered with the boarding of the attic floor, since it had become necessary to use the attic as a dormitory for the inmates. In view of these facts I reported to the Board of Supervisors that the condition of the building was imminently dangerous to the health of those dwelling in it, owing to the leaky condition of all the drains; to the fact that they were neither properly ventilated or trapped, and to the condition of the main outlet sewer, which was totally unfit to carry off the sewage; both because of its large size,

and because of the settlement and deflection of the structure from a true grade, provided it was ever placed on a proper grade. I further informed them that the disposal of the sewage by allowing it to run down into an open water course into the city of Troy was a nuisance dangerous to the public health and should be at once stopped. I reported, also, that the ventilating apparatus was so unfit as to be utterly useless, and that the building could not be made sanitary without thoroughly reforming the house drain and the building of a new outlet sewer properly proportioned to the work that it was to do both as to size and grades. A plan had been proposed I was informed for building a sewer from the county-house down to a point where it could discharge into the Hudson through one of the outlet sewers of the city of Troy, and I was requested to examine this scheme and to consider it with reference to other matters by which the sewage of the poor-house could be got rid of. An investigation of the topography and the soil of the lands belonging to the county, around the poor-house soon showed that there were excellent facilities for disposing of the sewage by intermittent downward filtration through filter beds having an outlet into the Paper Mill pond on the Wyantskill. A preliminary survey showed that the cost of this method of sewage disposal would be less than a quarter of the proposed scheme for building a brick sewer to the Hudson or to connect with the sewers of Troy. I therefore recommended this method and the report having been adopted by the Board of Supervisors I was requested to make detailed plans and surveys for filter beds for the disposal of the sewage and for a new main sewer leading to these beds, and also to make complete plans for putting the plumbing of the building into a thoroughly sanitary condition and for making the ventilation effective. The house committee being directed to carry out these improvements under my advice and direction the work has been completed and in operation for some four months. The ventilation of the building has been thoroughly accomplished by running large ventilating boxes horizontally along the attic floors into which all vertical flues were brought by tight connections. Each horizontal box being about 160 feet long and two by four feet in cross section. Near the center of each box it is enlarged to form a hot air chamber and from these chambers large vertical flues of galvanized iron go up through the roof. In each hot air chamber is a powerful steam radiator to create an upward current. The tile drains under the house were replaced with iron ones, all fixtures were thoroughly trapped, all joints tightly caulked with lead and a complete system of ventilation provided so that there should be air currents through all the principal sewer pipes. At the heads of the long drains which carry the sewage of the hospitals to the main outlet sewer, automatic flush tanks of the pattern made by B. Van Vranken, of Schenectady, were placed in the cellars in tanks made of two inch planks. They are usually set so as to flush

the drains twice a day and in a every way their working has been most satisfactory. All the house drains were brought together into a man-hole just west of the building near its center, and from this point an outlet sewer made of salt-glazed vitrified pipe eight inches in diameter was carried down to the filter beds, man-holes being placed at each change of grade or alignment. Even at the hours when the maximum use of water occurs in the building this eight inch pipe is rarely one-third full. This shows what gross extravagance was used in the building of the old four foot brick sewer to do the same work. There are three filter beds including in all about an acre. They are thoroughly underdrained with round agricultural drain pipes two inches in diameter. Owing to the low position of the beds the drain tile begin about four feet below the surface and are only about two feet below at their point of discharge into the outlet ditches. The lines of tile are about twenty feet apart. The sewage is intended to be turned on to one bed for a day or two, and then on to the next, then on to the third thus giving the first bed time to purify itself before more sewage is applied. The sewage of 350 people has been thus taken care of with complete satisfaction both to the institution and to the neighborhood. In walking over the beds on a hot day, after they had been used some two months, hardly any odor was perceptible. The water running from the drains was clear and had no odor. No difficulty has been experienced in the working of the beds during the cold weather. The cost of the outlet sewer of the filter beds and the drains from them, was less than $1,800. Since the carrying out of these sanitary improvements there have been no cases of illness in the keeper's family, and no cases among the inmates in any way traceable to sanitary defects in the building; at least none have come to my knowledge. The sanitary evils were very gross and their consequences to the keeper of the poorhouse most serious. But the remedy applied seems to have been completely successful.

Very respectfully yours,

JAMES T. GARDINER,
Civil Engineer.

The report was approved by the State Board of Health.

LEWIS BALCH,
Secretary.

REPORT ON THE SEWERAGE OF MOUNT VERNON, WESTCHESTER COUNTY.

LEWIS BALCH, M. D., *Secretary of the State Board of Health:*

SIR. — The previous reports of the Board show what efforts have been made to assist the people of Mount Vernon in abating the present gross and dangerous nuisance arising from the discharge of sewage into an open brook running through the village. The matter has been much complicated by the question of proper sewage disposal, the only available body of water to which the water of the sewage could be returned being Hutchinson's creek, or river, as it is sometimes called. The people of Eastchester, living along this stream, have successfully defeated all attempts of the people of Mount Vernon to secure an outlet for crude sewage either into this stream or into the tidal channel of Eastchester creek, into which it empties. The State Board has, after several examinations, advised both parties that a scheme might be devised for the economical and efficient sewering of the village of Mount Vernon, and that sewage might, without unusual cost, be so purified that without harm to anyone it could be discharged at a proper point into either the Hutchinson river or Eastchester creek. In accordance with these suggestions, a bill authorizing the sewerage of Mount Vernon was passed by the last Legislature, which provided that the plan, both for sewerage and sewage disposal, should be approved by the State Board of Health before being executed. In accordance with the provisions of this act, Mr. William E. Worthen was selected by the village as engineer to prepare a plan for the sewerage of Mount Vernon and the sewage disposal works. In order that the village might not be put to the expense of making a plan and then finding that it would not meet the approval of the State Board, the village trustees requested the State Board of Health to allow their engineer to act in consultation with Mr. Worthen, shaping the plans from the beginning so that they would meet the approval of the State Board; the expense of such engineering work to be borne by the village of Mount Vernon in accordanc with the law. Being directed to undertake this matter, I met the committee of the trustees and Mr. Worthen on the fourteenth of September last. The outlines of several plans were submitted with regard to the disposal of the sewage. I informed the trustees and Mr. Worthen that I felt confident that the method of sewage disposal they proposed would result in producing a nuisance, and independently of the question of the State Board approving any such plan, that if in the disposing of the sewage they created a nuisance, the parties aggrieved could have recourse against them in the courts; and I felt confident that the line of action which they suggested would result in an endless

succession of costly and vexatious litigations against the village. I went with them over the ground and I think that both the trustees and engineer of the village were convinced that the course they had desired to take would not prove satisfactory even to themselves. I suggested that, on the whole, I considered the system of intermittent downward filtration as the best method of disposing of their sewage, and we visited together certain tracts of land which were adapted to the purpose both by reason of the topography and the condition of the soil, the only question being as to the quantity of land available. A system of sewage filtration through artificial filters had been proposed to the village with which I was not practically familiar, although I had been familiar with the literature connected with it, some experiments having been made by the company at Saratoga, the report of which was in my possession. This system of sewage filtration being in use at Atlantic City, N. J., I was requested by the committee of trustees and by Mr. Worthen to visit Atlantic City and inspect the practical working of the system, as it was necessary to decide whether to use artificial filters or to filter through the soil. Both Mr. Worthen and myself were in favor of filtration rather than subsidence tanks under the conditions present at Mount Vernon, a very high degree of purification not being necessary. I visited Atlantic City on the fifteenth and found the filters in question at work. I examined their construction and took three bottles of samples of the effluent from the filters to one of the sewage as received from the pumping station. The effluent water from the filters is filled with a black flocculent mass of partly decomposed sewage. The channels and pools through which this passes off into the tidal creeks are lined with offensive decomposing materials. Chemical analyses made by Prof. Willis G, Tucker, analyst of the State Board, showed that the effluent from the filters is as impure as the sewage before filtration. From every point of view the result of filtration of sewage, through artificial filters, as practiced at Atlantic City at the time of my visit, were totally unsatisfactory. On the other hand, in order that the results of intermittent downward filtration through soil might be seen by the representative of the village, I requested Mr. Worthen to meet me in Albany that we might visit together the filter-beds at the Troy poor-house, which I had constructed in July, and which had been in operation since the early part of August. No notice of our proposed visit was given to the Superintendent, and on the twentieth of September Mr. Worthen and I examined the beds. The effluent water was perfectly clear and had no perceptible odor. A very slight odor was perceptible in walking over the beds themselves. They had not been properly cared for, the sewage having been run too long on the bed then in use. On further inquiry I found that nobody had been near the beds for ten days. In spite of this neglect no nuisance had been created and the effluent, as we have said, was in a satisfactory condition.

Mr. Worthen was satisfied with this comparison of the two methods of sewage filtration and decided to use the system of intermittent downward filtration through land. At his request I visited New York both on the twenty-eighth of September and on the fourth of November, to consult respecting the plans which were in progress for the sewerage of the village. The work in this matter, as you see, is still incomplete.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

REPORT ON THE DRAINAGE OF A SWAMP AT DALTON, LIVINGSTON COUNTY.

Lewis Balch, M. D., *Secretary of the State Board of Health :*

Sir.— In the latter part of June the board of health of the town of Nunda requested you to send, at their expense, the engineer of the Board to examine the sanitary condition of the town of Dalton, and to advise them with regard to the sanitary effects of a swamp in the village of Dalton, and as to the best methods of its drainage.

I visited Dalton and met the board of health on the thirtieth of June. It had been supposed that the swamp was caused by the building of the Erie Railway embankment and it was therefore the duty of the road to provide for its drainage. A careful examination of the ground showed beyond question that the swamp was not caused by the Erie Railway embankment, but was the natural basin in which the drainage of quite a large area centered; a long oval basin having very little fall and being under laid with impervious hard-pan some four feet below the surface. The village of Dalton practically surrounds the upper half of this oval swamp, and it is unquestionably a serious menace to the health of the people. In the earlier part of the season it is filled with water which sets back into the lower parts of the village through the subsoil and enters the cellars. Rank vegetation grows as the season becomes warmer; the sources of water supplying the swamp dry up; the swamp itself gradually dries; the rank vegetation decays and in the early autumn all those conditions are present which are most promotive of malarial diseases. In addition to this the swamp has been used as a place for house drainage of the village. Back of the hotel the sewage stood in decomposing pools on the surface of the swamp producing conditions both offensive and dangerous. I advised the town board that it was their duty to declare the swamp a nuisance dangerous to the public health, and that the owners of the land should be required to drain it. Several plans for this drainage had been suggested which I examined, all of them would have been ineffectual and would have resulted in the expenditure of money without securing the drainage desired. I explained this to the board giving my reasons therefor. The village of Dalton being the principal railway station of the town and the swamp lying close to the hotel and station many of the people of the town are exposed to its malarial influences, The desire for the sanitary improvement seemed to be so great that the town board expressed their willingness to have made at the public expense a plan for the proper drainage of the swamp provided that the property owners would execute it. At their request I made during July final surveys and a plan for the complete drainage of this property in such detail that it

could at any time be executed. The village board have, as I understand, directed the property owners to provide for the drainage of the swamp in a manner as efficient and permanent as that described in the plan and have placed the plan at their disposal. If the property owners refuse to drain the swamp in a thorough and permanent manner, it was the intention of the board of health to proceed to do it themselves, and charge the expense to the owners of the land. Whether this extreme action has yet been taken I am not informed; but the final surveys showed that at a moderate expense the swamp could be thoroughly drained and made a most valuable tract of land.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

REPORT UPON THE PISCAWAN CREEK NUISANCE.

ALBANY, N. Y., *July* 7, 1886.

LEWIS BALCH, M. D., *Secretary State Board of Health:*

DEAR SIR.— In accordance with your instructions I have to-day visited with you that part of the course of Piscawan creek alleged to be in such condition as to be a nuisance dangerous to life and health, and which has been complained of to the State Board of Health, the region lying between the north line of the city of Troy and the State dam.

At the north line of Troy the old channel of the Piscawan creek is crossed by the avenue running east from River street to the cemetery. No water appears to be coming from the north down Piscawan creek, and I was informed that this was due to the fact that the sewer recently built on Second street in Lansingburgh had intercepted all the flow from the head-waters of the Piscawan, at least the low water flow of this stream is said to be all taken into the sewer. However this may be, the water in the old channel of the Piscawan within the limits of the city of Troy does not now come from the parts of the creek lying within Lansingburgh, but from the drainage of houses within the limits of the city of Troy and from a small stream flowing, I am informed, from the water works reservoir which comes down at Glen street to the Piscawan.

The old channel of the creek straightened to form a straight ditch runs half way between North Fourth street and Vail avenue and until recently has formed the only outlet for the drainage of houses containing between three and four hundred people. A sewer has now been built along Vail avenue and the houses on the west side of the Piscawan are now drained into this sewer; but all the houses lying between the Piscawan channel and the Troy and Boston Railroad, so far as they have drainage, have no outlet except into this creek. In spite of the fact that no other means of drainage was provided for these houses, the owners of the land through which the old channel runs, for the creek can' no longer be said to exist, were directed by the city authorities to fill the old channel.

In three places along the course they have done so. Drainage into the old channel, however, still continues. The result is that these fillings across the channel have divided it into a series of pools in which the sewage and drainage from the houses stands stagnant. The course of the creek within the limits of Troy is one long filthy cesspool. In some places the filling has resulted in backing the sewage up into the cellars of houses where it stands to-day in pools festering in the intense heat.

As nearly as I can estimate from three to four hundred people are to-day living either directly ovor or within a few hundred feet of this pestilential nuisance.

I counted houses containing in all probability from one hundred and fifty to two hundred people, the sewage from which is to-day emptying into this old channel of the Piscawan where it stagnates

and evaporates, leaving the filth to breed disease. This sewage consists of laundry water, kitchen waste and water-closet drainage. There is but one efficient and permanent remedy for this state of things, and that is by building a sewer beginning at Cemetery avenue, which is the Troy line, and running southward along North Fourth street to say Middleburgh street, where it may turn westward and enter the Vail avenue sewer. Such a sewer will provide means of drainage from the houses along Fourth street and for those on Glen and other streets that may be opened between North Fourth street and the Troy and Boston Railroad.

This sewer at its north end can take in any high water flow that may come down the old channel of the Piscawan from Lansingburgh. It will be, undoubtedly, of decided advantage to the southern part of Lansingburgh. Any attempt to relieve the present evil by building a line of sewer on Glen street from North Fourth to Vail avenue will necessarily be a failure; for the houses whose drainage is mostly contributing to the foul condition of the old channel of the Piscawan are those situated along Fourth street.

The Fourth street sewer would accommodate all these people and all those on Glen and other streets east of and adjacent to Fourth. I fully concur with you in the views you have expressed as to the necessity for the immediate filling of the Piscawan channel. Great as will be the inconvenience to the people of having all their drains cut off, such inconvenience seems to be infinitely preferable to the greater danger which now threatens the locality from the existing nuisance.

Tubs can be placed under the privies to receive this material and the waste water from the houses can be thrown upon the surface in the back yards with much less danger than to concentrate it in festering pools such as now exist along the channel of the Piscawan.

The immediate cleaning and filling of this channel and the stopping of all drainage into it is undoubtedly a necessity, and the inconvenience thereby caused to the people can only be remedied by a sewer built southward from the city line in North Fourth street, such sewer will provide fully for any flow down the old Piscawan channel from Lansingburgh, for the small stream now coming down at Glen street, and for the drainage of houses between Fourth street and the Troy and Boston Railway, and no other plan that I know of will accomplish these results, all of which are necessary to the sanitary condition of the locality.

RECOMMENDATION.

I therefore advise the immediate cutting off of the drains now emptying into the Piscawan creek; the filling of the old channel from the Troy line to the river, and the building of a sewer from the northern line of Troy southward along North Fourth street at least to Middleburgh, where it can be given outlet into the Vail avenue sewer.

Very respectfully yours,

JAMES T. GARDINER,

Consulting Engineer.

PLAN PROPOSED FOR THE ABATEMENT OF THE NUISANCE AT SOUTHAMPTON, L. I.

Dr. LEWIS BALCH,
Secretary New York State Board of Health:

SIR.— Acting under your instructions I visited the village of Southampton, L. I., and submit the following plan for the abatement of the nuisance:

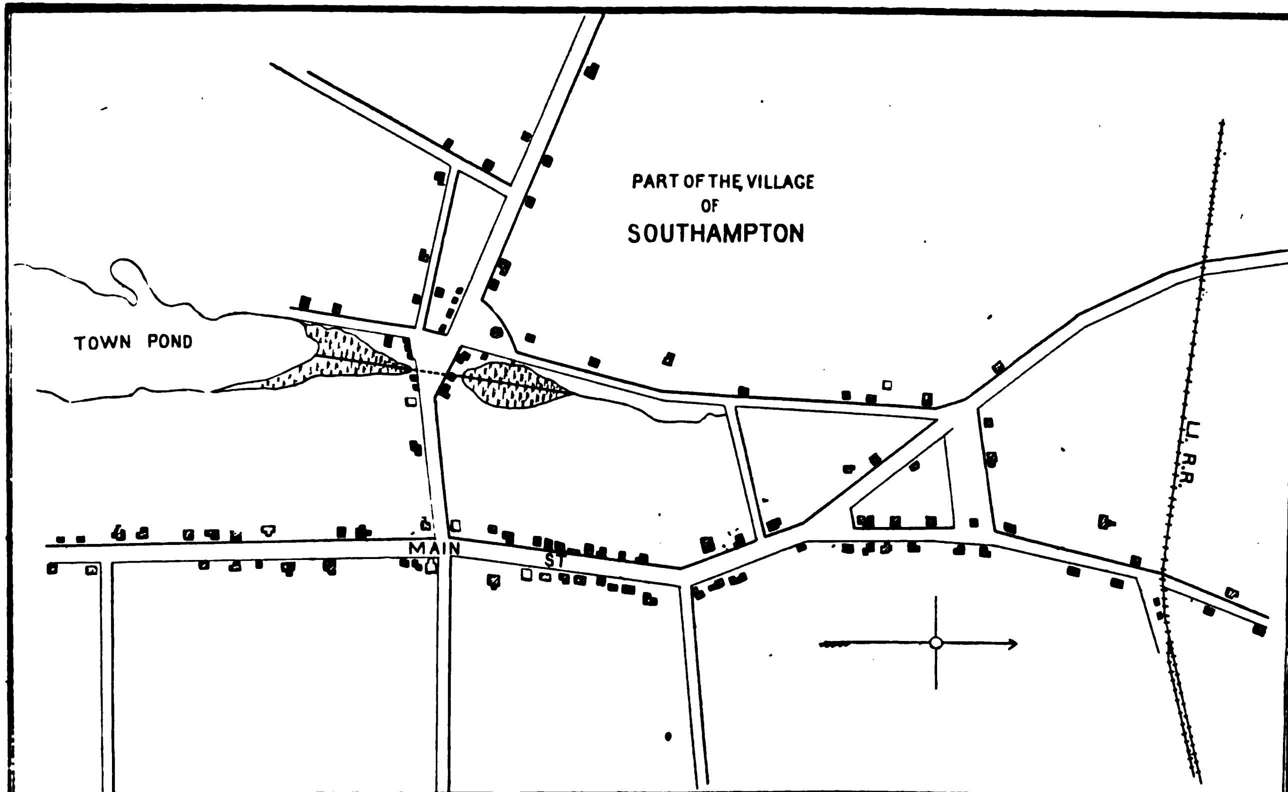
PLAN PROPOSED.

A ditch about two feet wide on the bottom should be dug from the lake along a course somewhat as indicated by red line in sketch, to the north end of the upper marsh the banks should be sloped about two to one. This will soon render the most of the marsh dry. Should any springs abound near the edges of said marsh they will be readily discovered and lateral ditches can be dug to them. Across the street a stone culvert, with throat about two by two feet, should be laid, or large sewer pipes put in and covered. The length of the main ditch will be about 1,300 feet, and the whole expense of opening the ditches and making the culvert will be about $300. After the marsh has once dried out, the open side ditches, and perhaps the main one through the marsh, can be replaced by putting in agricultural drain tile. Though unless special pains were taken, it would be better to leave the ditches open for a few years. Care, however, should be taken to keep these ditches cleaned out and in good working order. Although no real danger need be apprehended in digging these ditches at any time, the work would be safest done in the fall after a frost and in cool weather.

The owners of the marsh should not be allowed to build thereon unless the marsh is filled sufficiently to render the site suitable for human habitation. Great care should be taken by all residents living about the marsh, and so near the ground water, to keep their surroundings clean. Their privy vaults and cess-pools are dangerously near their drinking water, and it should not be necessary to wait until an epidemic removes loved ones before looking carefully into these matters. The importance of this should be impressed upon the minds of the members of the local board of health, as this complaint shows that they are criminally careless and unworthy of their positions in not taking steps long ago to render this place fit for human habitation.

There is no doubt but that this marsh is a nuisance and detrimental to the public health; a nuisance that threatens the health and lives of the whole community. The method of sewage disposal in connection with water supply is a dangerous one, as practiced by the majority of the house owners, and should be improved.

O. S. WILSON, C. E.


PART OF THE VILLAGE
OF
SOUTHAMPTON
TOWN POND
MAIN ST
L.I. R.R.

REPORT ON NUISANCE AT FAIRPORT.

STATE BOARD OF HEALTH OF NEW YORK,
ROCHESTER, N. Y., *November* 6, 1886.

DR. LEWIS BALCH, Esq.,
Secretary State Board of Health, Albany, N. Y:

DEAR SIR.— In accordance with your request of the twenty-seventh ult., the undersigned would state that on the thirtieth ult., he made a careful examination of the condition of a large, abandoned mill-pond, now owned by the New York, West Shore and Buffalo Railroad Company, in the village of Fairport, Monroe county, New York. The inspection was made in company with Messrs. Allen Benedict, John M. Williams, Truman Butts and Henry Jerrels, members of the village board of health, who had complained of the noxious exhalations from the said premises to the railway company, but without obtaining the necessary relief, even after the declaration of the premises as a nuisance, and the due service of a notice to that effect. The general facts in the case, as derived from my investigations, are herewith submitted in the following

REPORT:

A few years ago, before the construction of the New York, West Shore and Buffalo Railroad through Monroe county, there existed in the central portion of the village of Fairport a large mill-pond, which was formed by the construction of a dam across the channel of Thomas creek. This pond was located in the triangular area west of Main street, north of the Erie canal and south of the New York Central and Hudson River Railroad, as shown upon the accompanying map. The creek flows in a westerly direction through a broad valley, with very gentle slopes on the northern side, while on the southern side the slopes are much greater, the hills rising in some places quite abruptly from the margins of the stream. The Erie canal winds along these hillsides on the southern side of the valley at an elevation of from twenty-five to thirty feet above the bed of the creek, so that the latter serves also to intercept the leakage or percolation from the canal as well as to receive the general drainage from the extensive southern slopes.

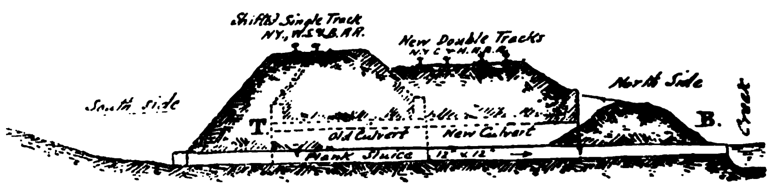
No public sewers are yet in existence in that portion of the village which lies north of the canal, and all private drains in this district necessarily have a natural outfall into the creek and mill-pond. Of such private drains from premises west of Main street, quite a number have heretofore been constructed, both as shallow ditches on the surface of the ground, and also as subsoil pipes or tiles for draining cellars, all of them discharging into the former mill-pond. In consequence of the presence of the canal, and of the percolation of water from the same into the more or less pervious

soil of the particular locality under consideration, the maintenance of these drains and their outfall is of the utmost importance to the health of the residents; and if, by any cause, the drains are rendered inoperative, or if the convenient and natural outfall is removed, then, in the absence of a suitable public sewer, a serious sanitary and financial burden is placed upon this entire district of the village.

Now this undesirable condition of affairs has actually occurred. The entire mill-pond and water privileges appertaining thereto was purchased some years ago by the New York, West Shore and Buffalo Railroad Company, for railway purposes, and a single track was duly laid upon an embankment, from eight to ten feet high, constructed directly through the larger portion of the old mill-pond, as shown upon the appended map, which is copied in part from the records filed in the Monroe county clerk's office by the said railroad company, and in part from maps in the canal engineer's office at Rochester. On this map, Q A B D R I M K indicate the probable channel of Thomas creek prior to the construction of the New York, West Shore and Buffalo Railroad and the new tracks recently built by the New York Central and Hudson River Railroad Company, immediately adjacent to the single track of the former road. F D P I M N O indicate the outlines of the former mill-pond; C denotes the location of the former grist-mill; C F represents the former head-race, which conveyed the water from the pond to the mill; C S Q, the former tail-race, which delivered the water used on the wheels into the stream at a lower level; F D denotes an earthen embankment or dam across the bottom of the valley; and D d f, a pair of timber dams or overflows across the creek itself, and which are now entirely removed. To avoid the cost of constructing and maintaining two bridges over the creek, the New York, West Shore and Buffalo Railroad Company made a new channel, I K, for the creek on the northern side of their track embankment, and cut away the two timber dams D d and d f; and a cut through the earthen dam F D at E, on the southern side of the track, a stone culvert under the railroad embankment at T, and a ditch from T to E continued for some distance easterly, was thought sufficient to provide for the drainage of that portion of the old mill-pond and low lands lying south of the track.

These provisions, however, do not prove adequate to remove the water which collected in the bottom of the old pond, and the latter soon became a swamp, with the usual results. Apparently, the bottom of the culvert T was located at too high an elevation, or else the ditches T E G H were too shallow, or became obstructed. Complaints from the local board of health were practically disregarded by the railroad company in consequence of financial embarrassments, and an attempt was then made by the company to fill up the low grounds and swampy areas without expense by opening up the area as a dumping ground for all sorts of refuse from the village. This procedure has now aggravated the troubles caused by the swamp alone, and the advice of your

Board is sought in the premises. The New York, West Shore and Buffalo Railroad was leased recently by the New York Central and Hudson River Railroad Company, and in order to make the operation of the two railways more convenient, a new line of double track road was constructed on the northern side of the single track line built by the New York, West Shore and Buffalo Railroad Company, as indicated on the map. Further alterations of the existing water-courses thus became necessary, and the creek was diverted from its former channel, A Q into the old tail-race A S Q, along with minor alterations along A B D and P I K. The culvert T was also lengthened so as to pass under the two new tracks, while the single track of the New York, West Shore and Buffalo Railroad was moved a few feet southerly without any extension of the culvert masonry. The result of these operations at this locality was to completely obliterate the southern termination of the culvert T, and to almost wholly obstruct the same at its northern end near the creek; but in order to allow some water to pass through into the creek, a small plank sluice or tube, about twelve inches wide and twelve inches deep, was laid through the culvert and the earthen banks formed beyond the ends of the masonry as indicated in the adjacent diagram.



By shifting the track of the New York, West Shore and Buffalo Railroad somewhat to the south, however, the ditch formerly dug from T easterly became filled up, and to compensate for this obstruction the plank sluice or tube was extended about fifty feet easterly along the foot of the embankment to meet a new small ditch.

The only inference that can be drawn from these constructions of the New York Central and Hudson River Railroad Company is that the mill pond and low grounds south of the railway are eventually to be filled up and that the stone culvert T will thus become useless. To this proposition it may fairly be objected that the entire mass of material used in filling up the undrained low area will become saturated with water and thus be rendered unhealthy. It may, perhaps, be urged that the railroad embankments are not impervious, and that a serious saturation of the filling material will not occur; but here the reply would be that if these embankment are not firmly compacted so as to be substantially water-tight then they are unsafe for railroad purposes; and the longer that they are subjected to the weight and vibrations of trains, the more compact and impervious will they become. In my opinion, these

embankments will practically act, sooner or later, like the earthen banks of water storage reservoirs and will retain nearly all of the surface and subsoil drainage waters, together with the appreciable percolation from the canal, which would naturally gravitate towards the creek from the south; and hence, before the filling up of the low area is undertaken, ample provision for subsoil drainage should be made by the complete restoration of the culvert at T or its fair equivalent. The low area in question extends from Main street to this culvert, a distance of over 1,200 feet, and has an average width of about 130 feet, thus giving an area ot nearly *four acres* which would be rendered unhealthy if filled in without previous drainage. An area of such magnitude in the central portion of a flourishing village, and which in all probability will become the site of factories, shops and dwelling, on account of its convenient location relatively to the railroads and the Erie canal, should receive, during its transformation, the careful attention of the sanitary authorites, and every effort should be made to secure the proper facilities for the escape of the water before the filling up takes place.

It has already been stated that the railroad officials have allowed this low ground to be used as a general dumping place for rubbish from the village. My examination showed that the margins of the old mill-pond site are now covered with large accumulations of rotten wood, waste paper, rags, refuse from chemical works, straw, decayed vegetables, scrap sheet iron and tin, etc.; also that a number of private drains had formerly been laid from buildings in the vicinity to the old pond, and that the mouths of some of these pipes had been obstructed by the rubbish. Such a condition of affairs cannot fail to be insalubrious, and hence it is not surprising to learn that much sickness of a serious nature has occurred in this portion of the village during the past two or three months. It is stated that during this period of time four deaths from typhoid fever, from among the residents of this district, have occurred, and that there is a large number who suffered from fevers of a malarial character. In this case I advised the local board of health to look closely after the wells from which the domestic water supplies were taken, since the nature of the soil, the absence of sewers, and the filthy condition of the surface of the ground in a number of places, indicated the possibility of a serious pollution of the wells.

To what extent the exhalations from the swampy bottom of the old mill-pond, during the past summer, are responsible for the prevalence of typhoid fever, I am unable to say; but I have little doubt that a large share of the malaria complained of, and noticed by physicians among the residents of the district under consideration, is directly attributable to this source, as well as to the decaying organic refuse which has been dumped along the margins. The practice of depositing such matter in the wet lands is reprehensible, and should be stopped at once. My advice was to collect all of the

combustible matter thus deposited, and to burn it as soon as practicable; also to cover the remainder with a deep layer of clean, fresh earth — places that were particularly foul being first treated with quick-lime; further, that the proper measures be taken to secure thorough drainage of the low area before any more filling in occurs. With regard to the practicability of such drainage, it may be said that no physical difficulties here present themselves. There is an abundance of fall in the creek from the culvert T westerly, and if it should prove that the bottom of this culvert has been built at too high an elevation, the construction of a new culvert at that point, or at any other more convenient locality between T and Main street, and the deepening of the existing channel of the creek for a few hundred feet westerly, would not be a very expensive matter. After a suitable outfall has thus been provided, the drainage of the swampy bottom of the old pond can easily be effected by means of a few ditches cut therein. In this work much of what has already been done by the railroad company can be utilized, provided that obstructions, like large stumps and caved banks, are removed.

As the land in question is owned by the railroad company, and as the natural water-course has been diverted for the convenience of said company, also, since the deposit of objectionable organic rubbish upon the property of said company was duly permitted and countenanced, it seems clear that the railway authorities should perform all of the work necessary to abate the evils which have arisen in consequence of their operations. The expenses thereby involved will probably not exceed $800, and this sum is small in comparison with the saving effected by the diversions of the creek. The questions involved in the right to drain into the abandoned mill-pond, and in the duty of the railroad company to provide a proper artificial out-fall, in place of the natural stream which they have diverted for purely economical reasons, are herewith passed over as they are of a legal character.

In view of the foregoing, I would recommend that the abandoned mill-pond at Fairport be thoroughly drained; that if it is hereafter to be filled up, suitable covered drains be built upon its bottom with sufficient grades towards the outlet culvert, or culverts, under the railroad embankments, and that the material used in filling up be free from putrescible organic matter. On its part, the village board of health should interdict the dumping of offensive matter upon the swampy area, and should take precautions to prevent the discharge of sewage or domestic wastes thereon from surface or subsoil drains. The advice with regard to the prevalence of the fevers mentioned, and the probable causes thereof, is not within my province, and must accordingly be left to your own more competent judgment.

Respectfully submitted,

EMIL KUICHLING,
Civil Engineer.

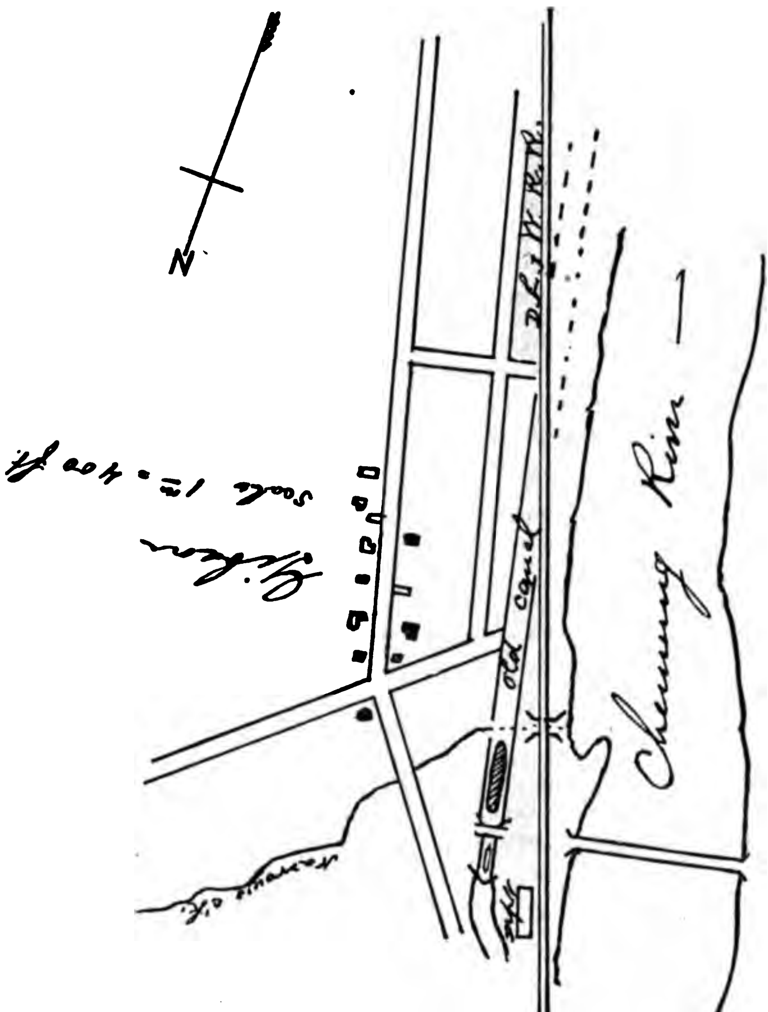
PLAN FOR ABATING NUISANCE AT GIBSON.

OFFICE OF SUPERINTENDENT OF PUBLIC WORKS,
ALBANY, *July* 23, 1886.

DR. LEWIS BALCH, *Secretary State Board of Health:*

DEAR SIR.— Please find map and estimate for filling up old lock at Corning and abating nuisance. If it meets the approval of your Board, please return it with indorsement, and oblige. I will commence the work at once upon the receipt of the same.

I remain very truly yours,
JAMES SHANAHAN, *Superintendent.*



Dr. LEWIS BALCH,

Secretary New York State Board of Health:

SIR.— I submit the following with regard to the nuisance existing at Gibson, near Corning:

I visited the place on the twenty-ninth inst., in company with Mr. C. Bennett, the engineer in charge of the work, under Laws 1886, chapter 276. Gibson is a small settlement, about one mile south-east from Corning, on the abandoned Chemung canal, just below the old State dam in Chemung river.

Since the canal was abandoned, the Delaware, Lackawana and Western Railroad has been built along the river, and their Corning depot established at Gibson. Said depot is between the canal lock and river. (See sketch).

Across the lower end of said lock a highway bridge crossed the canal. The canal at this point is now filled, so that the bridge trusses only serve as guard rails on either side of the highway. Some water now stands in the bottom of the lock above this bridge or crossing, also in the old canal bed below this bridge, and extending to the bed of Narrows creek.

The appropriation was made to abate this nuisance, which will be readily done by filling these two holes with earth, as planned by Mr. Bennett, who estimates that 2,250 cubic yards will suffice to fill them to the level of the land adjoining. He also proposes to obtain the material for filling from the bed of Narrows creek under the railroad, and from the river near by, which will improve the water-way of this torrential stream at the same time.

It is my judgment that the plan of Mr. Bennett will abate the nuisance in a simple and effective manner.

Yours very respectfully,

O. S. WILSON.

ALBANY, *July* 31, 1886.

ALBANY, *August* 9, 1886.

Hon. JAMES SHANAHAN, *Superintendent Public Works:*

SIR.— In answer to your communication of July 25, 1886, asking the approval of the State Board of Health upon the plans for filling the abandoned Chemung canal at Gibson, N. Y., as required by chapters 276 and 440, Laws of 1886, I would respectfully state that the plans as submitted having been carefully examined, are approved by me as executive officer of the State Board of Health, and are herewith returned.

I remain sir, yours truly,

LEWIS BALCH,

Secretary.

STATE DRAIN AT HORSEHEADS.

On June six, the following letter was received at Central office:

HORSEHEADS, N. Y., *June* 2, 1886.

Secretary State Board of Health, Albany, N. Y.:

DEAR SIR. — I have been elected health officer of this village. The board of health of this village, I think, wants to do its duty. They have instructed me to make the following request of you:

First. Inform us if we shall cause to be made for the village, a registration of vital statistics separate from the town.

Second. That you send an engineer here to inspect the drain made by the State under the direction of the State Board of Health, a year and a half ago, a part of which is a failure, and advise us how to repair it, and

Third. That the said engineer be requested to give us a plan for the disposing of the privy refuse of the village.

Respectfully yours,

R. P. BUSH.

The letter was referred to Superintendent Shanahan, from whom the following return was received.

OFFICE OF SUPERINTENDENT OF PUBLIC WORKS,
ALBANY, *June* 7, 1886.

DR. L. BALCH, *Secretary State Board of Health, Albany, N. Y.:*

DEAR SIR. — The communication from R. P. Bush, to you, and referred by you to me, bearing date June second, is just received. In reply I would state as follows:

The drain at Horseheads was constructed according to a plan approved by the State Board of Health and the nuisance complained of was abated. If any additional nuisance is created, it is no fault of the State. The engineer, Mr. Wilson, is now on the ground or near there at Havana, and I would refer you to him for any further information.

Yours very truly,

JAMES SHANAHAN,

Superintendent Public Works.

P. S. The full address of Mr. Wilson is O. S. Wilson, Havana, N. Y.

In accordance with this suggestion the complaint was referred to Engineer Wilson, from whom the following report was received:

DR. LEWIS BALCH,
Secretary New York State Board of Health Albany, N. Y.:

SIR. — In accordance with instructions received from your office, I have the honor of submitting the following with regard to the present condition of the State drain at Horseheads:

I respectfully refer you to the map and reports made by myself in July 1884, and later for the better understanding of what the surroundings were at the completion of the work. There are three lines of pipe through the E. C. & N. R. R. embankment, two of which are in the canal and one for Mud brook, the latter emptying into the canal after passing through Mr. McCombers' tannery. The pipes referred to were put in by the railroad company and were not disturbed by the State. It was part of the plan adopted by your board to have these pipes left to assist in carrying off the water in time of freshet. When the railroad embankment was moved by the owners the earth was put in the canal bed in such a way as to cover the lower ends of both the pipes in the canal, thus preventing the passage of water. As a consequence, when the first freshet occurred the Mud brook pipe was the only available outlet (except the State pipe) and the water rushing into the catch-basin, placed at the mouth of Mud brook to take its summer flow into the State drain, nearly destroyed it and prevented its successful operation. In consequence Mud brook now runs into the canal bed keeping it wet between the railroad and the first street south (name forgotten). It is this part of the canal that is the cause of the complaint made by the health officer.

Had the owners, in removing the railroad embankment, left the other two pipes open — as they promised — it is my judgment that the catch-basin referred to would have been working successfully to-day. As it is it may cost twenty-five dollars to restore said catch-basin and clear the two pipes referred to for use in time of freshets.

As to the disposal of privy contents and household slops I will state that the soil in the village is loam and gravel for a depth of ten to thirty feet, underlying which is a bed of blue clay varying from ten to 140 feet in thickness. The drinking water used in the village is obtained from wells the majority of which are driven until water is found *above* the main bed of clay underlying the village; though some of them pass through a thin bed of clay before water is obtained in sufficient or constant quanties. Within the past year a few wells have been put down through the bed of clay referred to above with good success in all cases when the clay has been fully penetrated. In one case a well was drilled 150 feet without penetrating the clay, and proved a failure — though the deepest well in the village. The expense attending this method of

obtaining water will doubtless be a barrier to its general adoption. It is apparent that in such a soil the utmost care should be exercised in keeping impurities out of the soil.

Privy vaults and cesspools are almost universally used and abandoned for new ones when filled. In a few cases drawers are used under the privies, the contents of which are composted and used as fertilizers. There are a few vaults that are periodically cleaned. The cases where any precautions of this kind are observed are rare — comparatively — and still more so with reference to the household and kitchen drains. There have been cases of typhoid fevers within two years in the village that were so located as to almost prove their origin owing to a single source of pollution, and several of these cases proved fatal.

When told that their source of water supply is a dangerous one or that new methods of filth disposal should be generally adopted, one is met with the expense attending such methods.

It is my opinion that the people of Horseheads can obtain the most of life and civilization at the least expense by the general — compulsory of need be — adoption of tight drawers under their privies and tight cesspools or vaults for house or privy refuse. The same to be emptied as often as necessary to keep the same from being a nuisance to themselves and their neighbors.

HORSEHEADS, *June* 10, 1886.

Very respectfully submitted,

O. S. WILSON,
Civil Engineer.

ALBANY, N. Y., *June* 12, 1886.

The State Board of Health would approve of the use of tight drawers or tubs for privies, but considers it a safer method for the disposal of garbage and waste that barrels, tubs, or some other receptacle be used, which can be carried away and emptied, in the place of vaults or cesspools. These latter are rarely if ever completely water tight, and consequently do not guard against the danger of leakage of fluid substance into the surrounding soil.

LEWIS BALCH, M. D.
Secretary State Board of Health.

NUISANCE AT ATTICA.

A petition was received through the Attorney-General's office, from Burley Smith and others, of Attica, complaining of the insanitary condition of a certain sewer in the village, and of the indifference of the local authorities to the complaint. The following documents show the complaint and the action taken by this office to secure the abatement of the nuisance:

STATE OF NEW YORK.
ATTORNEY-GENERAL'S OFFICE,
ALBANY, *October* 7, 1886.

Respectfully referred to State Board of Health with request that same may receive attention.

D. O'BRIEN,
Attorney-General.

ATTICA, N. Y., *September* 30, 1886.

To the Attorney-General:

HONORED SIR. — We, residents of East avenue in the village of Attica, N. Y., beg leave to call your attention as a member of the State Board of Health to what we term a nuisance, which is not only very offensive to the residents of this street, but may prove disastrous to the public health.

The facts are these: "A few years ago the trustees of the corporation of the village of Attica were instrumental in constructing a sewer running from the north bounds of Main street, through a small ravine, to the north bounds of said East avenue, into which flow the waters of a living spring. The outlet of this sewer is within ten feet of the sidewalk on the north side of said East avenue. Since the construction of said sewer the ravine through which it runs has been filled up and several residences erected near by. Many residents of Main and Walnut streets drain their refuse matter, including the contents of several privies, into this sewer, and from its outlet the said refuse matter runs along on top of the ground through the channel made by this spring, near many dwelling-houses, causing at times a stench almost unbearable. There has been much sickness on this street; some cases of fever, the origin of which is attributed by good medical authority to this refuse matter.

"We have requested the trustees, at different times, to abate this nuisance. They all agree that it ought not to exist, but take no steps toward its abatement. They have met several times to consider the matter, but no satisfactory results have followed their deliberations. We make no unreasonable demand, but earnestly request that this matter may receive the consideration its serious nature calls for."

To that end we trust that you will call the attention of the State Board of Health to this case at your earliest convenience. We can furnish abundant evidence in support of the foregoing statements, if desired, and as one knowing of the alleged grievance, would refer you to Hon. R. S. Stevens, of this place, who will fully corroborate our statements. Would be glad to hear any suggestions from you tending to assist in the settlement or adjustment of this matter. Direct all communications to Burley Smith, Esq., Attica, Wyoming county, N. Y.

Very respectfully yours,

BURLEY SMITH.
RUSSELL J. STONE.
W. F. COGSWELL.

ALBANY, *October* 9, 1886.

BURLEY SMITH, Esq., *Attica*, *N. Y.*:

DEAR SIR.— The petition of September thirtieth, of yourself and others, addressed to the Attorney-General, was by him referred to this office yesterday.

The nuisance you complain of is undoubtedly one needing relief. The question comes up as to whether it is not better to adopt some plan for proper drainage of the village, or only to act upon this one trouble alone. The board of health of your village has the power to remedy the nuisance in two ways: First, after having found it to be a nuisance dangerous to the public health, by condemning it as such, and directing the village trustees, as the parties maintaining the nuisance, to abate it. Second: By doing the necessary work themselves, in case the trustees do not obey their directions, the work to be paid for in the same way as other village work.

I am of the opinion that some plan for general sewerage would be well to have adopted. To this end the village should employ a good sanitary engineer, who could advise all that would be necessary. The plan should be so made that in case of growth of the village, new sewers could be laid as needed, which would be in accord with those already done.

This work could not now be started before spring, except the general surveys and plans, as the season is too far advanced to lay sewers successfully, but arrangements could be made looking to this improvement for next year. An engineer could be sent by this office, in which case the village would be expected to pay his fee and expenses.

I will write to the health officer of your village concerning the nuisance you complain of.

I remain sir, yours truly,

LEWIS BALCH,
Secretary.

ATTICA, *October* 12, 1886.

The State Board of Health:

GENTLEMEN.— Your letter of the ninth of October received, and in reply would say that the nuisance we complain of is a sewer laid jointly by the trustees of this village and the parties using it. It was laid between Main street and East avenue, in a natural ravine, and when it reached the avenue it was allowed to stop and discharge the contents — say ten or more privies and sink drains on my lot, and within five feet of the sidewalk. The board of health officers and trustees of the village have both looked at it, and say it is all wrong. All that they ever done was to employ an engineer, make plans and specifications and buy the tile to extend the sewer. The tile are piled up here in the village. It would cost but little to extend it, as it runs down the ravine spoken of, which is eight or ten feet deep, and to the Tonawanda creek. The cost of excavation would be nothing, and they have the tile. If they would even extend it 1,000 feet and take it away from the houses it would help us some. We have had cases of typhoid and malarial fevers last year and this within two hundred feet of it, and at this writing have several cases of diphtheria in the village. In extending this sewer you interfere with no plan of general sewerage, and there can be no objection that I can see. If you can help us out you will greatly oblige this section of the village.

Respectfully,

BURLEY SMITH.

October 13, 1886.

To BURLEY SMITH, Esq., *Attica, N. Y.:*

DEAR SIR. — Your favor of the twelfth inst., is received. We have this day made a formal request of the local board of health of your village to immediately abate the nuisance from which you are suffering and which we hope will be at once acted upon. Should no attention be paid to this request it will be necessary for this board to use the power conferred upon it by subdivision 1, section 3, of chapter 270 of the Laws of 1885, and to order the local board of health to convene and do its necessary work. We trust that such will not be necessary and that the local board will of its own volition heed the request of this office and abate the nuisance.

I send the communication to the local board in your care. Please hand it to the president and kindly inform this office of the names of your village board of health.

Very respectfully yours,

FREDERICK CARMAN,

Assistant Secretary.

ATTIOA, N. Y., *October* 21, 1886.

The State Board of Heath :

GENTLEMEN.— You will pardon me for not answering your communication before, but I have been absent for a few days. In 1885, there was what I suppose would be called a town board of health. J. D. Turrell, supervisor of this town, as president, Dr. Gifford, health officer, and Edward Skinner, secretary. Since that time they claim to have had no board of health. And the trustees of the village have acted. And I delivered the communication that was addressed to the board of health in my care, to the clerk of the board of trustees. They have had one meeting since and did not take any action in the matter, they will meet again on Monday night, and if they do not notice it at that time will inform you.

Respectfully,

BURLEY SMITH.

ATTIOA, N. Y., *October* 26, 1886.

Mr. Fred Carman, Assistant Secretary State Board of Health, Albany, N. Y:

DEAR SIR.— Your communication addressed to the board of health of the village of Attica in care of Burley Smith, Esq., and being dated October 13, 1886, was received by the board of trustees of the village of Attica last evening and ordered filed. In compliance with the instructions thereon the board of trustees will proceed to investigate the alleged nuisance under and by virtue of section 4, of title 4, and chapter 449 of the Law of 1853, and have appointed Thursday, October 28th as a day for the hearing of the grievances of the parties complaining. The result of their inquiries and the investigation will be duly transmitted to your honorable Board.

By order of President.

Very truly,

V. DECOT,

Clerk.

The matter rested pending the organization of the local board of health, when the matter was again agitated and presented to that body for final disposition.

FOOD AND DRUGS.

REPORT.

CANNED FRENCH PEAS AND BEANS.

On the fourth of October a petition was received from Messrs. Boardman & Boardman, attorneys for James P. Smith, importers of New York city, asking exemption from the operation of the food and drug law for certain peas and beans imported from France and admitted to be colored with a certain minute proportion of sulphate of copper. The boards of health of New York city and Brooklyn having forbidden the sale of these peas, the importers sought the decision of the State Board of Health thereon. Samples of the peas and beans were procured and sent to the three public analysts of the board and the amount of copper contained therein determined quantitatively. The results agree pretty closely and the only question now to determine is whether peas containing the proportion of copper therein found ought to be permitted to be sold for public consumption. The following are the papers in the case:

STATE BOARD OF HEALTH OF NEW YORK,
ALBANY, *December* 2, 1886.

To the Hon. DAVID B. HILL, *Governor State of New York:*

SIR.—I have the honor to submit for your excellency's approval the following declaration of the State of Board of Health, made at a regular meeting held in the city of Albany, on the 23rd day of November, 1886 — in reference to exempting certain canned peas and beans from the operation of chapter 407 of the Laws of 1881:

James P. Smith, importer, of the city of New York, on September 29, 1886, petitioned the State Board of Health to inquire into and determine the healthfulness of certain canned peas and beans, imported by him from France, and having, for the purpose of preserving, a certain proportion in each can of the sulphate of copper.

Under instructions from this office, the three public analysts of the State Board of Health, purchased in open market, cans of peas and beans of the brands imported by Mr. James P. Smith, quantitative analyses were made, showing the quantity of copper found in each can, and the results transmitted to this office.

Taking these reports into consideration; the fact that for years these peas and beans have been used by the public without injury; that the extent of the dealings in these articles of food was very large, and formed an important branch of industry and commerce; that it could be but speculative as to the harm that might be caused by their use; the board reached the conclusion that no danger or menace to the public health would be had by allowing the use as food of canned peas and beans containing the amount of copper found to be in the cans purchased by the annalysts.

And, further, that in order to legalize under the food and drug law, the sale of peas and beans canned with a certain amount of sulphate of copper, the board resolved to submit for your excellency's action, the subjoined declaration, in which importers and dealers in canned peas and beans having copper as a preservative, are required to place upon the label of such cans the fact that copper is contained therein and the amount thereof, said amount of copper not to exceed three fourth of a grain per avoirdupois pound of peas or beans, equivalent to three grains of crystallized sulphate of copper.

Your excellency's attention is respectfully called to the papers appended.

I have the honor to remain, sir,

Your obedient servant to command,

LEWIS BALCH,

Secretary State Board of Health.

PETITION OF JAMES P. SMITH.

To the State Board of Health of The State of New York:

The petition of James P. Smith of the city, county and State of New York, respectfully shows:

That your petitioner and his predecessors in business, have been engaged in the business of wholesale grocers in the city of New York for more than fifty-five years last past, and that your petitioner is at present carrying on said business in said city of New York, and also in the cities of Chicago, in the State of Illinois, and Paris, France.

Your petitioner further shows that during the period above mentioned the business house with which he has been connected, has been largely engaged in the importation into this country of canned or preserved peas. That said peas were put up or prepared in France, and that in their preparation a very slight amount of copper has been used for the purpose of preserving to a certain extent, the natural color of the peas and their consistency.

That the use of copper for this purpose, and in the amount mentioned, has been universal in France for the period referred to in this petition, and that the business of preserving peas in this way in France, constitutes a very large and important industry, the peas so prepared being used in France and exported to all parts of the civilized world, and that a large proportion of such peas, has, for many years past, been imported into the United States and sold throughout the markets thereof.

That your petitioner's business house has alone imported and distributed in the United States more than 10,000,000 packages of such peas. That your petitioner has never heard of any case in which the use of the peas so imported and distributed by his house as an article of food has resulted in injury or sickness of the slightest extent to the persons so using them.

That as your petitioner is informed and believes, peas, prepared in the same manner are exported from France into England and used in the latter country to a very large extent. Your petitioner further shows on information and belief that the question of the wholesomeness of preserved or canned peas in which copper has been used to the extent that it has been used in the goods imported by your petitioner, has been carefully and thoroughly examined into by the highest scientific authorities in France, under the direction of the French Government, and also under the direction of the health authorities in France, and that in every instance the conclusion come to has been unanimous that copper used to the extent in which it is used in the preparation of peas, imported by your petitioner, is in no way injurious or detrimental to the public health.

Your petitioner presents as a part of this petition a statement containing citations from authorities on this subject.

Your petitioner further shows that he has submitted specimens of the peas imported by him to a scientific expert, namely, to Prof. R. Ogden Doremus, Professor of Chemistry and Toxicology in New York Bellevue Hospital, Medical College, who has analyzed the same, and your petitioner annexes to this petition a report of the said Doremus showing the results of such analysis, and his opinion on the question of whether the articles submitted for analysis are injurious or detrimental to health.

Your petitioner further shows that he has on hand a large amount of canned peas, prepared in the manner above referred to, specimens of which have been submitted to your board for examination and analysis. That none of said specimens have been prepared or selected for the purpose of such examination, but that such specimens have been selected indiscriminately from the stock on hand, and are fair specimens of all the stock held by your petitioner.

Your petitioner further shows that canned peas, prepared in the method above described, have been for a great many years recognized as ordinary articles of food in Europe, Great Britain and America.

Your petitioner further shows that he is informed and believes that the boards of health of the cities of New York and Brooklyn intend to prohibit the sale of canned peas in which any copper whatever is present, without reference to the question as to whether copper to the extent in which it is contained in the goods offered for sale by your petitioner is injurious to health.

Your petitioner further shows that such a proceeding would be in conflict with the opinion of the highest medical and scientific authorities on the question involved, and that it would not only prevent the sale of the large stock of goods imported in good faith by your petitioner, but would also strike a disastrous blow at a large and important branch of trade.

Your petitioner, therefore, prays, that your honorable Board will, under authority conferred by chapter 407 of the Laws of 1881, entitled "An act to prevent the adulteration of food or drugs," examine into the question of how far copper may be used in the preparation of canned peas without the risk of injury to public health, and may declare that canned peas, with such a proportion of copper used in the preparation thereof as your honorable Board shall determine is not injurious to public health, may be exempted from the operation of said chapter 407 of the Laws of 1881.

All of which is respectfully submitted.

JAMES P. SMITH.

CITY, COUNTY AND STATE OF NEW YORK, *ss.:*

James P. Smith, the petitioner named in the foregoing petition, being duly sworn, deposes and says, that he has read the foregoing petition subscribed by him, and knows the contents thereof; and that the same is true of his own knowledge, except as to the matters therein stated to be alleged on information and belief, and as to those matters he believes it to be true.

JAMES P. SMITH.

Sworn to before me this 28th day of September, 1886.

CHARLES L. THATCHER,
Notary Public (78) *N. Y. Co.*

BELLEVUE HOSPITAL MEDICAL COLLEGE,
NEW YORK, *August* 3, 1886.

JAMES P. SMITH, Esq.:

DEAR SIR. — I have examined the samples of French peas and beans you sent me for analysis, with the following results:

"*Petits pois extra fins*" — *Barton fils* — *Paris.*

	Peas.	Liquid.	Total grammes.
Copper per can	0.021	0.002	0.023

"*Petit pois extra fins*" — *Dandicolle & Gaudin* — *Bordeaux.*

	Peas.	Liquid.	Total grammes.
Copper per can	0.044	0.002	0.046

"*Petits pois sur extra fins*" — *Fontaine Freres* — *Paris.*

	Peas.	Liquid.	Total grammes.
Copper per can	0.0198	0.0013	0.0211

"*Haricots Flageolets*" — *Dandicolle & Gaudin* — *Bordeaux.*

	Beans.	Liquid.	Total grammes.
Copper per can	0.028	0.003	0.031

I have the honor to remain,

Your obedient servant,

R. OGDEN DOREMUS, M. D., LL. D.

Prof. Chemistry and Toxicology in N. Y. Bellevue Hospital Medical College.

N. Y. BELLEVUE HOSP. MED. COL.

DEAR SIR.— As a toxicologist and a physician, I am of the opinion that the trivial amount of copper which I have found in the imported French peas and beans, reported on the adjoining page, is not injurious to health.

Many of the most distinguished European chemists, toxicologists and practitioners of medicine, such as Pasteur, Brouardel, Galippe, Gauthier, Proust, Gallard, Honnerkopf, Stubenrauch, Rademacher, Muller von Pforzheim and others, have carefully investigated this subject, some of them by government request, and they unanimously agree, after repeated experiments, continued through many years, that the small amount of copper in canned vegetables is not hurtful to those partaking of the same.

In fact, many claim that the copper is prophylactic in its character, or beneficial to health.

It is well known that during cholera epidemics workers in copper and compounds of copper have been exempted in a marked degree from attacks of this terrific scourge.

I have the honor to remain,

Your obedient servant,

R. OGDEN DOREMUS, M. D., LL. D.

Prof. of Chemistry and Toxicology in the "Bellevue Hospital Medical College.

NOTES ON THE USE OF SULPHATE OF COPPER IN CANNED GOODS.

In 1877 the attorney general in Paris appointed three experts, Messrs. Brouardel, Riche and Magnier de la Source to report on samples of canned vegetables confiscated as containing sulphate of copper,* and to decide if the quantities of that metal found in them could be considered as injurious to health and as a falsification or an adulteration in food. The experts made the following answer:

First. "We think that the quantity of sulphate of copper found in the canned goods submitted to our analysis cannot be called an adulteration or falsification.

Second. "From our personal researches and experiments on copper, as well as from those made by others before us, we conclude that the doses of that metal found in the cans analyzed cannot be injurious to health."

After these two answers the attorney general discontinued the prosecution.

Later on the question was again submitted to the Conseil d'Hygiene de France † who appointed a commission, Messrs. Pasteur, Brouardel and Poggiale. (The latter died before the report was made.)

The conclusions of the report were: The government can tolerate the use of salts of copper for coloring canned vegetables as it is done now, under the reserve that the substance used will be printed on the label.‡

These conclusions were adopted by the "Conseil d'Hygiène de France" on the 12th of December, 1879.

Later again the same couseil d'hygiène, on the proposition of Dr. Brouardel appointed another commission to study the question once more. This commission was composed as follows:

M. Bouley, member and ex-president of the Academie de Medecine, member of the Institut de France, general inspector of veterinary colleges and member of the comité consultatif d'hygiène de France; M. Brouardel, professor of legal medicine at the Faculte de Paris, member of the Academy of Medicine of the Comité consultatif d'Hygiène; Dr. Decaisme, member of the Société de Medecine publique; Dr. Galippe, director of laboratory at the Faculté de Medecine de Paris; § Dr. A. Gauthier, professor at the Faculté de Medecine, director of the laboratory of biologic chemistry at the faculté de Medecine, member of the Conseil d'Hygiène du Départment de la Seine; A. J. Martin, general secretary of the Society

*Reprinted in full in annex G. Ann. d'hygiène Publique et de Med. Legale, Paris, 1880, third series, III, p. 205 *et seq.*

† Ann. d'hyg. Publ. et de Med. Leg., Paris, 1880.

‡ 3 s., III, 193-213.

§ Reference next page.

of Public Medicine; Dr. Napias, ex-general secretary of the Society of Public Medicine; Dr. Proust, professor at the Faculté de Medecine, member of the Academy of Medicine and of the comité consultatif d'Hygiène; *M. Ebrelat, architect, professor at the Conservatoir des Arts and Métiers; M. Beral, chief engineer of mines, member of the Conseil d'Etat de France.

All the members of this commission have approved the report, also have the following: M. Paul Bert, secretary of Public Instruction; M. Beclard, senior member of the Faculté de Medecine; Messrs. Depaul, Hayem, Potain, professors at the Faculté de Medecine, members of the academy; M. Lancereaux, professor and member of the academy; Messrs. Planchon, Bouis, Bourgoin and Jungfleish, professors at the College of Pharmacy, members of the Academy of Medicine; M. Girard, professor at the Faculté des Science de Lille; M. Arnold, professor at the Faculté de Medecine de Mille and others.

The Commission gave the following conclusions, which were the same as those already given in 1878 by Messrs. Bouchardat and Gauthier* to the International Congress of Hygiene, held in Paris, and which were adopted by that Congress, viz.:

Considering that copper exists in the animal system in general and in many of the natural products, sometimes in a larger quantity than in the canned vegetables carefully greened with copper; considering, also, that it is demonstrated that after an experience of more than twenty-eight years, and on a great scale, the canned vegetables colored by copper have never caused any accident, we conclude that there is no cause to prevent the coloring of vegetables with the use of sulphate of copper under the reserve that it should be limited to a certain quantity, which would be about four milligrammes of metallic copper for 100 grammes of vegetables drained.

Dr. N. Du Moulin, professor of therapeutics at the University of Gand, Belgium, writes in his book 'On the use of salts of copper in treating scrofulose' (1885.) "We said, in 1877, that all that refers to toxicology of copper in sanitary regulations of police, in criminal laws and in pharmacology ought to be entirely modified. The time is now come everything is altered. Nobody to-day admits chronic poisoning by copper amongst workmen working that metal; nobody would believe in accidents caused by the prolonged use of copper in therapeutic doses. The reports of people poisoned by eating food prepared in copper vessels are gone to the rank of impossibility. Vegetables and canned goods colored by copper are inoffensive."

Messrs. Pasteur and Brouardel, and later M. Gallard, all three commissioned by the comité consultatif d'hygiène de France, have declared it in the most positive manner in their reports and were unanimous on the point. And to conclude, the Court of Appeals of Bruxelles, in a decision which created a great sensation in 1883,

* Rev. D'hyg. de police sanitaire, Paris, 1880, II, 374–384.

has ratified in the right of application all the scientific facts above mentioned in discharging some manufacturers who were prosecuted for having colored canned vegetables with salts of copper and acknowledged it. The judgment was based on this: "That it was not established that the accused had mixed some injurious matters to food." This implies that the court admitted that it is known that copper is not an injurious substance and that the use of it for coloring vegetables is not an adulteration or falsification, and does not come under the law.

We, therefore, consider now that the jurisprudence is established and the rehabilitation of copper, considered as a poison, is now an accomplished fact, thanks to the experiments and labor of Messrs. Toussaint, Galippe, Tott, Pasteur, Brouardel, Gallard and Du Moulin.

Dr. Gallard writes in his book* (Copper and Canned Vegetables, p. 7): There is not a fact more positively established now and on a more solid basis than the perfect innocuity of salts of copper.

Dr. Du Moulin says, on page 876 of his book: "In our experiments we have met with many cases where dogs which we tried to poison, for the use of our laboratory, with salts of copper, never died, whatever doses of sulphate of copper were given. Dr. Galippe never succeeded to kill a dog in all his experiments, after having given enormous quantities of all kinds of salts of copper.

In a sitting of the Academy of Medicine of Belgium, December 26, 1885,† Dr. Du Moulin said: Large doses of salts of copper have never killed dogs (according to Galippe, Toussaint, Du Moulin, etc.). I have not the conviction that large doses of these salts would kill a man, but I have on that point no personal experience, having never had the occasion to witness a case of poisoning by copper on a man. I have given to children of three to eight years 1.50 to 2.50 grammes of sulphate of copper in five or six days' time; they vomited the first days, often only the first hour, and they were well after.

I do not affirm anything, I make my reserves, but what is certain and reassuring for the human being is that salts of copper, if they are poisonous, can only be so if taken in very large quantities, and then it could only be through suicide. Never could they be dissimulated in such quantities, even in the most spiced food, without being detected through their color and still more through their very bad taste.

As for the small and even medium doses, such as are used in preparation and preservation of food and in cases of sickness, they are certainly inoffensive. It is proved by thousands of experiments and remarks published in all countries. (Toussaint, Hönner-

* Gallard Le cuivre et les conserves de legumes, Paris, 1888, page 7.

† This volume of the proceedings is being bound. The title is Bull. Acad. de Med. Belge, Bruxelles, 1885.

kopf, Stubenrauch, Galippe, Tott, Rademacher, Muller von Pforzheim, Burg, Ducom, Bourneville, Charcot, Du Moulin, and many others.)

I affirm with Messrs. Gallard, Pasteur, Brouardel, Galippe and others, that the innocuity of salts of copper at small and medium doses is one of the medical truths established on the most solid basis.

In February, 1882, in a case of diphtheria on a child of nine years, two grammes of sulphate of copper were given in four days; the child did not vomit after the fourth hour, had no diarrhœa nor collic, he was not poisoned, and is now very well. What are to these two grammes in four days the very small quantities found in green vegetables.

In May, 1880, a girl, three years old, suffering also from the same illness, took in four days eighty centigrammes of sulphate of copper, she recovered and was somewhat more heathy than before.

I could record a great number of such cases as I treat all cases of croup with sulphate of copper. Since the oldest times, copper vessels have been used, and are still used for cooking or domestic purposes, and it is only about 1700 that without well known reasons it was said that copper was a dangerous metal, and that utensils manufactured with it could cause serious accidents; I should not be surprised if the fashion had something to do with it.

It is said that there is not a book on toxicology which does not rank salts of copper amongst the most violent poisons; this is true. I do not know a single book which does not affirm the toxicity of the salts of copper, but this affirmation has for me but very little weight. Who are the authors of these books on toxicology and therapeutic? From what source have they taken their convictions? Would they be of more value than those of experts who have made a specialty of the study of the effects of copper, and as one can say of Dr. Galippe, has made it the aim of his life? Except Orfila, the others have made none or very fresh experiments on copper; they are encyclopedists who have read and resumed works written before them. Dr. Galippe — we give here the declaration of one of the largest manufacturers of vertdegris—(Verdet): "* Since I was born I have lived by this business, the same as my fathers, and in my factory there is not a single example of the manufacturing of vertdegris having caused the least sickness amongst the workmen. I have employed women of all ages and constitutions, and never have seen one sick. In the morning they eat their breakfasts in the workshop,and in working they cut their bread and carry it to their mouths without washing their hands; they make their cookery in the same conditions, and they are never sick through it. During the cholera epidemic in 1855, neither in this factory nor in others in Narbourne has a workmen been struck with the disease."

M. Armand Gauthier writes: It is well established to-day that

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* Quoted in full by Galippe (see next page), pp. 34–5.

doses of copper, small enough that the metallic objectionable taste is not easily detected, can be absorbed in a continued manner without danger. These salts have been used since Van Helmont, in cases of epilepsy, hysterics, scrofula, cancer, phthisis, etc., and often during very long periods without altering the general health of the patient.

Dr. Bourneville * has given to epileptics from forty-three to 124 grammes of sulphate ammonia cupric during a period of 122 to 365 days.

Dr. V. Galippe has tried on dogs the different salts of copper without having to signal any other accident than the dislike they had for the food overdosed of these salts. He has been able to give to these animals doses of salts of copper varying from 0 grammes fifty to three and four grammes a day.†

In 124 days' time a dog has taken seventy-two grammes of acetate of copper, another forty-eight grammes of vert de gris in forty days, another ninety-eight grammes of sulphate of copper in 150 days, another twenty-five (pp. 103-106) grammes of lactate of copper in fifty days, another thirty-nine grammes of tartrate of copper in seventy-seven days. All these animals have lived and several have gained in weight; the citrate, oxalate and oleate have given the same identical results.‡

In 1869 W. Burg and L. Ducom, had already made experiments which had driven them to the same conclusions. Tô all these facts it may be objected that these experiments are, perhaps, conclusive as regards animals, but not as regards man.

The demonstration of innocuity of salts of copper on a healthy man can easily be done.

Twenty-six years ago Mr. Toussaint, experimenting on himself, proved that an adult can easily absorb 0 grammes two and 0 grammes five of blue vitriol or sulphate of copper during several weeks without inconvenience. He submitted himself to the action of all sorts of salts of copper during six months without altering his health.§

In his researches on the prophylactic and curative effects of copper against cholera V. Burg established by his own observations and on many other individuals in perfect health, that man can absorb ten to thirty centi-grammes of cupric salt without any other inconvenience than a little constipation and perhaps a little loss of appetite.

The experiment has been repeated and largely controlled by Mr.

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* Bourneville, Recherches sur l'epilepsi et l'hysterie, Paris, 1876, p. 17 *et seq.*, 43 to 123 grammes.

† 71, 75 grammes, pp. 56–62 and 88–94.

‡ 38.80 grammes, p. 109–112, Galippe — Etude sur le cuivre et ses composes, Paris, 1875. Burg and Ducom — Recherches sur l'action physiolog. de cuivre et ses composés. Arch. de physiol. norm. et path. Paris, 1877, 2 s., IV 182–205.

§ Toussaint Kupfer Kein Gift und Kupferne Gescherre unschädlich Vritschr. f. Gerichtl, ce. öff Med. Berlin, 1857, XII, p. 254 (doses not mentioned).

V. Galippe on himself and members of his family, with the greatest success. During a whole year he has eaten none but food prepared in copper vessels, meat, fish and vegetables, fat substances, dishes prepared with addition of vinegar or containing in their natural state vegetable acids, food of all kinds prepared and sometimes cooled in copper vessels not tinned, showing often the blue coloration indicator of the dissolution of the metal in doses until now reputed dangerous; this food did not produce on him colic nor diarrhea nor nausea nor any trouble of any kind. Certain of these effects on himself, he has been able to repeat these important experiments on persons who have been willing to lend themselves spontaneously; the results have been invariably the same.*

Under the care of Dr. Burg, hundreds of patients have taken during weeks and months twenty to thirty grammes of oxide of copper per day without any serious inconvenience.

Diabetic and neurotic people have been submitted to the same treatment, neither trouble in the nutrition or digestion have compelled to discontinue the use of this preparation. Copper exists in appreciable quantity in most of the ordinary food in natural state, which can be valued from one to six milligrammes per day. Chocolate or cocoa contains more copper than anything else.

By all that has been said above, it can be seen what we must think of this alleged poisoning by means of salts of copper criminally mixed in food; these cases appear to us nearly impossible (A.Gauthier, page 38). † Drs. Pecholier and St. Pierre in 1864 said; "Through our experience we are able to establish that the slow and daily effects of small quantities of vertdegris absorbed by women working at it, are favorable to their improvement in flesh. These women absorb copper and are in good health; we have never met with a case of copper colic amongst them. The absence of cholera in all these women leads us to conclude that the copper was a preventive and had the same properties in certain points as gold, manganese and especially iron. Effects of copper against cholera in 1885, 1886, in Paris out of 35,000 of its workmen working on copper only eight died, while out of 28,000 workmen working on iron and cast iron 202 died or seventy-two for 10,000. On 75,000 workmen on other metals, fifty-six deaths for 10,000, and in all other professions the number of deaths was ten to forty times larger than workmen on copper.

In another inquest: Out of 5,650 men working on copper not a single death by cholera. On 14,000 men working on copper and bronze, seven deaths On 6,000 men working on metals where a little copper is used, six deaths. On 11,500 men working on gold, silver and watchmaking, fifteen. On 28,000 men working on

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*Galippe. Ann. d'hyg. et de Medicine Legale, 1878, 2d series T. L., p. 426.

† Pecholier & St Pierre in Montpel Medicale, 1864, Montpelier, XII, 97. Etude sur l'hyg. des ouvriers employés à la fabrication du verdet. "Conclusions" corroborate generally, but says women enjoy immunity from *chlorosis* (not cholera).

iron, steel, 202. On 7,500 men working lead and tinware, eighty-two.

In 1865 the average death in the Paris population had been of thirty-seven for 10.000. Therefore there was fourteen times less deaths among the workers of copper than among any other inhabitants of Paris.

In Toulon, Marseilles, during the terrible scourge of 1865 the same remarks were made.

In Toulon out of 400 workmen on copper only one died, while in this unfortunate city the population reduced to 30,000 or 35,000, ninety persons died in a single day.

The same remarks have been made by M. Pietra Santa on the copper workers in the prison of the Madelonettes (1849 and 1854); by Huss of Stockholm on miners of copper; by Pecholier in Montpelier, on workers in vert de gris; by Cassiano of Prado on miners of copper of Tinta in Spain; by Gallarini and de Rogatis on workmen in copper of Naples and Florence. Besides Dr. Burg says that salts of copper are to a high degree antiseptic, and daily absorbed in small doses would preserve of contagious diseases others than cholera specially typhoid fever.

In Italy, as reported by the Journal d'Hygiene, 24th January, 1878, Drs. Livi and Barduzzi of Pisa, made a number of experiments, from which they drew the conclusion that sulphate of copper administered progressively to animals in doses of five centigrammes to one gramme is perfectly tolerated by the system, it seems to improve their nutrition and assimilation of food and it should be used in cases where nutrition is not beneficial or in cases of impoverishment of the blood. Dr. Feroci is also a believer in the theory that sulphate of copper is not pernicious, and he concludes that the belief that copper acts as a slow poison is unworthy of credence amongst scientific men.*

REPORTS ON SEVERAL ANALYSES ON CANNED VEGETABLES.

Pasteur: On ten cans of peas analyzed by him, the maximum of copper found was 0.100 milligrammes for one kilogramme of drained peas, or about twenty-five milligrammes per can.†

Dr. Galippe, in 1877, on twelve cans of peas bought in Paris, all colored by sulphate of copper, all of a different brand and well mixed together, found copper as follows:

First experiment. For one kilogramme drained peas, 0 gr. .048 metallic copper found.

Second experiment. In one kilogramme drained peas, 0 gr. .050 of metallic copper found. On a can of peas by itself, of another brand, 0 gr. .060 of metallic copper, or an average of 0.016 per can.

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* Quoted in Journ. D'hyg., Paris, 1878, III, p. 17 and 38–39. Title of work seems to be Levi and Barduzzi applications therapeutique peu comme du sulfate de cuivre.

† Pasteur compt. rend. de l'acad. d. sc. t., LXXXIV., page 293.

The liquor in which these peas were, contained 0.013 per ko., but it is known that this liquor should be thrown before using the vegetables. A can of peas is generally sufficient for four persons, so that they have each 0 gr. .014. This is little if one takes in consideration that the academy has awarded a prize to Messrs. Shote & Bergeron for a pamphlet stating that, in small doses, the salts of copper were not a poison.*

Dr. Galippe adds, in his report, that the sulphate of copper in canned vegetables does not, any more, retain this special character. When it is taken into consideration the enormous quantity of cans which are used in France and abroad, the reason refuses to admit and believe that this food can have the least injurious effect, and if they had had it would not have been overlooked. Of all this we conclude that the canned vegetables contain too small a quantity of copper to be prejudicial to public health.

ANALYSES OF ARMAND GAUTHIER, 1877, IN ONE KILOGRAMME OF VEGETABLES DRAINED.*

Green peas, fine, mark A, 0 gr. .083 metallic copper; beans, 0 gr. .099 metallic copper; green peas, fine, mark B, 0 gr .125 metallic copper; green peas, fine, mark C, 0 gr. .020 metallic copper; green peas, extra, 0 gr. .016 metallic copper; green peas, medium, 0 gr. .54 metallic copper. (P. 29.)

Of the analysis the following conclusion's can be drawn: The use of copper in canned vegetables is applied by most of the French and European manufacturers; about ninety-five per cent of the canned goods are colored with copper. The quantity of metallic copper found in them is sometimes as large as 218 milligrammes for 1 ko. (P. 30.)

However, these canned goods are used on a very large scale without any accident; we ourselves have eaten during a week peas containing 0 gr. .083 of metallic copper; we have given some to eat to several persons, women and children, without producing any apparent trouble. (Pp. 30, 31.)

These remarks are in perfect accordance with those previously made by Dr. Galippe. One and the other demonstrate that the poisonous effects of copper are infinitely smaller than it was supposed some years ago. (P. 31.)

*Etude sur les conserves depois reverdirs (not in library quoted by Gauthier).
† Gauthier ann. d'hyg., etc., Paris, 1879, 3, s. 1.

ANALYSIS OF STATE BOARD'S CHEMISTS.

REPORT OF PROF. LATTIMORE.

ROCHESTER, N. Y., *October* 22, 1886.

DR. LEWIS BALCH,
Secretary State Board of Health, Albany, N. Y.:

DEAR SIR.— In accordance with your instructions I respectfully submit the following report of my analysis of six cans of French peas received from you September fifteenth. The copper was obtained and weighed in the metallic form. The quantity of copper sulphate which would yield the several quantities of the of the metal is calculated from this basis.

Number.	BRAND.	Copper, per cent.	Equivalent copper sulphate, per cent.	Contents of cans, ounces.	Total copper per can, grains.	Equivalent copper sulphate, grains.
406...	Dandicolle & Gaudin, Bordeaux. ...	0.0045	0.0178	15.07	0.2963	1.1704
407...	Dandicolle & Gaudin, Bordeaux.....	0.0047	0.0186	16.03	0.3287	1.2984
408...	Barton Fils..........................	0.0078	0 0308	13.77	0.4691	1.8529
409...	Barton Fils..........................	0.0060	0.0237	14.37	0.3765	1.4872
410...	Fontaine Freres, Paris..............	0.0073	0.0288	14.37	0.4583	1.8103
411...	Fontaine Freres, Paris..............	0.0043	0.0170	13.77	0.2593	1.0242
	Average............................	0.0058	0.0228	14.56	0.3647	1.4439

ALBANY, *November*, 2, 1886.

DR. LEWIS BALCH,
Secretary State Board of Health of New York, Albany:

DEAR SIR.— Agreeably to the instructions contained in your letter of September twenty-ninth, I procured samples of the three varieties of French peas and one of French beans named therein and subjected them to analysis for the purpose of determining the amount of copper contained in each. The following are the results of the examination of each:

No. 1. "*Petit pois — extra fins.* Barton Fils, Paris." Contained in tin can. Weight of contents fourteen ounces. Purchased from G. W. Raynsford, grocer, corner Lancaster and Dove streets, Albany, October 19, 1886. Price twenty-five cents. Found to contain copper equivalent to 2.38 grains of the sulphate to the avoirdupois pound of 7,000 grains.

No. 2. "*Petit pois* — Dandicolle and Gandin — extra fins — Bordeaux." Contained in a glass jar. Weight of contents fifteen and one-half ounces. Purchased from Banfill & Amsdell, grocers, corner State and Dove streets, Albany, October 19, 1886. Price forty-five cents. Found to contain copper equivalent to 3.19 grains of the sulphate to the pound.

No. 3. "*Petit pois — sur extra fins* Fontaine Freres, Paris." Contained in tin cans. Weight of contents, fourteen and one-half ounces. Purchased from G. W. Raynsford, grocer, corner of Lancaster and Dove streets, Albany, October 19, 1886. Price thirty cents. Found to contain copper equivalent to three grains sulphate to the pound.

No 4. "Haricots Flageolets — extra fins. Dandicolle and Gandin, Bordeaux." Contained in glass jar. Weight of contents seventeen ounces. Purchased from G. H. Amsdell, grocer, corner of Maiden lane and Chapel street, Albany, October 19, 1886. Price forty cents. Found to contain copper equivalent to 3.56 grains of the sulphate to the pound.

The samples were purchased by my assistant, Mr. A. G. Losee, The contents of the packages varied in weight from fourteen to seventeen ounces and the amount of sulphate of copper in each would be as follows: No. 1, 2.08 grains; No. 2, 3.09 grains; No. 3, 2.72; No. 4, 3.78. The samples were all of a light grass-green color.

Yours respectfully,

WILLIS G. TUCKER,

Analyst.

STATE BOARD OF HEALTH OF NEW YORK.

Certificate of Analysis.

I hereby certify that on the 2d day of October, 1886, I procured a sample of *Petit pois sur extra fins* from Andrews Brothers, Syracuse, put up by Fontaine Freres, Paris.

I have carefully examined the same, and find that it contained of copper —

In contents of first can examined, 58.4 milligrammes = 0.9 grain.

In contents of second can, 53.4 milligrammes = 0.82 grain.

As in the case of 101 these quantities are the amounts of copper actually found in the contents of each can, holding about 400 cubic centimeters, or something less than a pint.

The contents of each can were dried and incinerated, and the copper was determined in the solution of the ash by electrolysis.

This solution was plainly colored by copper.

Dated November 1, 1886.

G. C. CALDWELL,

Public Analyst.

STATE BOARD OF HEALTH OF NEW YORK.

Certificate of Analysis.

I hereby certify that on the 2d day of October, 1886, I procured a sample of *petit pois extra fins* from Andrews Brothers, Syracuse, put up by Dandicolle & Gaudin, Bordeaux.

I have carefully examined the same, and find that it contained of copper —

First can examined, 44.2 milligrammes = 0.68 grain.

Second can examined, 43.1 milligrammes = 0.67 grain.

These quantities represent the quantity of copper in the entire contents of the can, holding about 400 cubic centimeters, or somewhat less than a pint.

The contents of each can were dried and incinerated, and the copper was determined in the solution of the ash by electrolysis. This solution was very distinctly colored, showing at once the presence of copper.

Dated November 1, 1886.

G. C. CALDWELL,
Public Analyst.

STATE BOARD OF HEALTH OF NEW YORK.

Certificate of Analysis.

I hereby certify that on the 2d day of October, 1886, I procured a sample of *petit pois fins* from Andrews Brothers, Syracuse, put up by Barton Fils, Paris.

I have carefully examined the same, and find that it contained of copper —

In contents of the first can examined, 31.7 milligrammes = 0.48 grain.

In contents of the second can, 27.5 milligrams = 0.42 grain.

The same remarks apply to this sample as in the case of Nos. 101 and 102.

Dated November 1, 1886.

G. C. CALDWELL,
Public Analyst.

STATE BOARD OF HEALTH OF NEW YORK.

Certificate of Analysis.

I hereby certify that on the 16th day of October, 1886, I procured a sample of *Haricots, verts*, from Andrews Brothers, Syracuse, put up by Dandicolle & Gaudin, Bordeaux.

I have carefully examined the same, and find that it contained of copper —

In the contents of the first can examined, 17.3 milligrammes = 0.26 grain.

In the contents of the second can, 20.5 milligrammes — 0.32 grain.

The same remarks apply to this sample as to Nos. 101 and 102.

Dated November 1, 1886.

G. C. CALDWELL,
Public Analyst.

WEIGHT OF COPPER PER CAN IN GRAMS. (*Grammes.*)

BRAND.	Doremus.	Caldwell.1	Lattimore.	Tucker.
Barton, peas	0.023	0.0317	0.030	0.039
Dandicolle & Gaudin, peas	0.046	0.0442	0.021	0.052
Fontaine, peas	0.0211	0.0584	0.029	0.049
Dandicolle & Gaudin, beans	0.031	0.0205[2]	......[3]	0.058[4]

1. Highest results, of two cans tested, taken. 2. Marked "Haricots Verts." 3. No analysis reported. 4. Marked "Haricots Flageolets."

The cans of same maker are *not* of absolutely uniform size, so the results are not strictly comparable.

The samples examined by me were not claimed to be from fresh importations by the sellers.

(COPY.)

The State Board of Health, by virtue of power conferred at a meeting, held on the 23d of November, 1886, does hereby declare:

That under and pursuant to section 4 of chapter 407 of the Laws of 1881, the following goods, when distinctly labeled in the manner provided in subdivision 7 of section 3 of said act, are within the conditions hereinafter prescribed declared to be exempt and permitted to be sold under the provisions of the said act.

Canned peas or beans in the preparation of which copper has been used, provided that the proportion of metallic copper shall not exceed three-fourths of a grain per avoirdupois pound of peas or beans equivalent to three grains of crystallized sulphate of copper, and that the same be plainly stated on the label.

I certify this is a true copy from the minutes of the Board.

LEWIS BALCH,
Secretary.

Approved December 2, 1886.

DAVID B. HILL,
Governor.

Filed in the office of the Secretary of State, December 2, 1886.

DIEDRICK WILLERS,
Deputy Secretary of State.

REPORT OF S. A. LATTIMORE, PH. D., ANALYST OF FOODS.

ROCHESTER, *December* 31, 1886.

DR. LEWIS BALCH,
Secretary New York State Board of Health, Albany, N. Y.:

DEAR SIR.— The duty of making chemical analyses of food articles and potable water, and of testing kerosene oil, having been assigned to me by the New York State Board of Health, I have during the year received and reported to you, in detail, upon four hundred and fifty-two samples, and now, in accordance with your request, respectfully submit the following summarized statement.

Samples have been received from the following twenty-three cities and villages of the State of New York:

Albany, Auburn, Binghamton, Brockport, Buffalo, Elmira, Hudson, Ithaca, Lockport, Middletown, Mt. Vernon, Newburg, Oswego, Poughkeepsie, Rochester, Rome, Schenectady, Sing Sing, Syracuse, Troy, Utica, Watertown, Yonkers.

Fifteen different classes of articles have been examined as follows:

	NUMBER OF SAMPLES.	
	Unadulterated.	Adulterated.
Allspice	4	2
Cassia	11	1
Cinnamon	15	16
Cloves	3	1
Coffee	7	5
Cream tartar	53	152
Ginger	....	1
Mustard	....	1
Pepper (black)	26	76
Saleratus	2	....
Total	121	255

Candy, aniline color	1
Candy, colors non-poisonous	3
Peas (French), all containing copper salts	6
Vinegar, acidity above legal standard	3
Vinegar, acidity below legal standard	13
Kerosene oil, above legal standard	20
Kerosene oil, below legal standard	20
Potable water	10
Total number of samples	452

CREAM TARTAR.

Within the last few years important improvements have been introduced in the processes of manufacturing this useful article. Of the fifty-three samples of cream tartar found to be unadulterated, nearly the entire number proved to be of a high degree of purity, generally above ninety-nine per cent.

But the adulteration of this article, as sold in the grocery trade, prevails to so great an extent, and even the substitution of mixtures of various composition, containing none of the real article for which they are sold, are so common, and yet so entirely unknown and unsuspected by the consumer, as to demand a more specific statement of the facts ascertained in the analysis of these samples.

Of two hundred and five samples, *purchased as cream tartar*, in grocery stores of all grades in twenty-three cities and villages of this State, only fifty-three, or nearly twenty-five per cent. were found to be free from adulteration; twenty-two samples contained cream tartar mixed with various substances, while the remaining one hundred and thirty were counterfeits, containing no cream tartar at all.

An article known in the wholesale trade as "Bone Acid Cream Tartar," "substitute for cream tartar," etc., seems to be largely used. Either alone or variously mixed with cream tartar, tartaric acid, or starch. It is sold by retail dealers as cream tartar. It is made by treating bone ashes with sulphuric acid, and is a mixture of two salts, calcium sulphate and calcium phosphate, known commonly as "super-phosphate of lime."

The following tabular statement exhibits the composition of the two hundred and five samples received as cream tartar.

Cream tartar, unadulterated	53
Cream tartar and starch	10
Cream tartar and terra alba	3
Cream tartar and terra alba and starch	3
Cream tartar and super-phosphate of lime	5
Cream tartar and super-phosphate of lime and starch	1
Tartaric acid and terra alba	42
Tartaric acid and terra alba and starch	30
Tartaric acid and super phosphate of lime and starch	11
Super-phosphate of lime	25
Super-phosphate of lime and starch	15
Oxalic acid and terra alba	2
Oxalic acid and terra alba and starch	1
Baking powder	2
Bicarbonate of soda	2
Total	205

The last four samples were doubtless sold as cream tartar by mistake.

That a well known and dangerous poison, such as oxalic acid should be used for fraudulent purposes in an article of food, implies a recklessness simply astounding. The quantity of the poisonous acid found in these samples was a little less than five per cent.

SPICES.

All classes of spices are still largely adulterated. As they are generally sold ground, it is quite impossible for the ordinary purchaser to distinguish between the adulterated and the unadulterated articles. A large number of manufacturers, however, send out unadulterated spices. The articles used for purposes of adulteration are extremely numerous. Most farinaceous substances which have become damaged and unsaleable may by skillful roasting and grinding, be rendered serviceable by the "spice mixer." Many other articles which might be included under the general term rubbish, by suitable manipulations, may be transformed into mixtures which closely resemble the various spices in color and appearance, lacking only a little seasoning with the smallest possible quantity of the real article to give the characteristic odor and fit them for the market.

VINEGAR.

The statute requires that vinegar shall have an acidity of not less than 4.5 per cent absolute acetic acid. Of sixteen samples examined only three were found to meet the legal requirement.

POTABLE WATER.

Ten samples of potable water have been analyzed and the required determinations reported. In nearly all cases the exact source of the samples was unknown to the chemist.

KEROSENE OIL.

The statute requires that kerosene oil, when tested in the apparatus and according to the conditions prescribed by the State Board of Health, shall not flash below 100 degrees Fahrenheit. Of the forty samples tested twenty flashed at or above 100 degrees Fahrenheit, while twenty flashed at lower temperatures.

Very respectfully,

S. A. LATTIMORE.

REPORT OF WILLIS G. TUCKER, M. D. PH. D., ANALYST OF DRUGS.

To LEWIS BALCH, M. D.,

Secretary of the State Board of Health of New York:

SIR.—During the period of about ten months which has elapsed since my last annual report was made, the collection and examination of drugs and pharmaceutical chemicals and preparations has been continued, 306 samples, including twenty-four of vinegar, having been purchased, analyzed and reported upon. As heretofore, monthly reports have been made to the secretary of the board, accompanied by separate reports on each of the samples examined, these stating name and record number of article; name and place of business of dealer from whom purchased; date of purchase with amount called for, and price paid and name of collector. The quality of each article, as determined by the examination made, has also been stated in each report, samples being classed as of "good quality" if they fulfill the requirements of the United States Pharmacopœia or fall below the same only in some trifling and unimportant particular; of "fair quality" if, while not fully up to the pharmacopœial standard, they are evidently neither intentionally adulterated nor decidedly below such standard, and of "inferior quality," if clearly adulterated or falsified; lacking in strength from improper manufacture, spontaneous decomposition or other causes, or containing an undue amount of impurity. In some cases, through ignorance or design, a wrong article has been sold or some inferior article of similar nature substituted for that called for, and particular attention has been called to such sales in the monthly reports, which have likewise stated the respects in which those samples not of good quality were deficient, and have given such other particulars as seemed necessary in special cases.

These reports not having been published elsewhere, the results are now collated and embodied in this general report upon the work done since the last annual report was made.

SELECTION OF SAMPLES.

The medicinal alkaloids, and all preparations containing them, constitute the department assigned to another analyst, and therefore no samples of this class have been collected; and as regards the wide field remaining, no attempt has been made to cover it by the examination of a great variety of articles. Many drugs and medicinal compounds are practically never adulterated or otherwise falsified, and many others are so seldom employed as to be of comparatively little importance. To examine such would have been a waste of time and it was deemed best, therefore, to select for examination, a rather limited number of articles of such a nature as to test the knowledge, reliability and integrity of the dealer in a manner entirely fair, all being officinal substances and no exceptional or

rarely used articles being called for. For the most part the articles selected have come under one or the other of the following heads: (1) Articles of prime importance which ought never to be dispensed unless pure and of good quality and which may easily be obtained by dealers in such a state, as for example, stronger ether and purified chloroform; (2) articles known to be frequently impure or adulterated, like precipitated sulphur; (3) articles of which several kinds or varities are designated in the pharmacopœia and one of these likely to be sold, ignorantly or intentionally for another, as, for instance, sublimed sulphur for washed sulphur; (4) articles prone to undergo decomposition or to deteriorate by age or exposure, like carbonate of ammonium; and (5) articles for which some common and cheaper substance is often substituted, like safflower for saffron.

Some samples of vinegar, twenty-four in number, were collected and examined during March and April last, but since the passage of the law, entitled "An act in relation to the manufacture and sale of vinegar" (chapter 606, Laws of 1886) passed June sixth, no further samples have been collected. This law is patterned after the Massachusetts statute (chapter 307, acts of 1884 as amended by chapter 150, act of 1885) and establishes the same standards, viz.: not less than four and one-half per cent by weight of absolute acetic acid for *all* vinegars, and, in the case of cider vinegars, not less than two per cent by weight of cider vinegar solids on evaporation. The standard adopted by the board, January 16, 1883, under and pursuant to section 4 of chapter 407, Laws of 1881, was "not less than five per cent of pure acetic acid" and "not less than one and one-half per cent of solid matters," but this applied to cider vinegar alone while in the new law the limit of acidity is applicable to all vinegars, and the imitation of cider vinegar practically prohibited. Experience has, I think, shown that the new standard of acidity is sufficiently high, some straight cider vinegars falling below five per cent of absolute acetic acid. The law above referred to, moreover, provides for the appointment of vinegar inspectors in the cities and towns of the State, for which reason no further collection of vinegar samples has been made.

METHOD OF COLLECTION.

All of the samples examined and here reported upon have been collected under my direction by Mr. A. G. Losee of Albany, who has visited the different localities, and in purchasing samples has tendered a written order in each instance, which order has given in full the officinal names of all ariticles called for, as in the following example: Purified chloroform, U. S. P., two fluid ounces: stronger ether, U. S. P., two fluid ounces; washed sulphur, U. S. P., one ounce.

Such an order, being perfectly explicit, if any error or substitution is made in filling it, the dealer alone is responsible. The collector has, moreover, in every case answered any question that may have been asked by the seller; and if any explanation has been

offered by him it has been noted. Most articles have been labeled by the dealers, and in all such cases the labels have been preserved since they have frequently contradicted the assertion of dealers, made after notice has been served upon them that a certain article was dispensed, when their own label as well as the chemical examination shows that such was not the case. All samples have been numbered, fully labeled and preserved, and complete records kept of every sample and of its examination.

NOTIFICATION OF DEALERS.

Dealers whose goods are reported as of inferior quality are notified from the central office and warned to desist from selling such articles, and if after two such notifications have been sent, articles of inferior quality are sold, it has been ordered that the name of the dealer shall be published. A somewhat singular fact, frequently observed, is that the price paid bears little relation to the quality of the article purchased, the highest-priced samples frequently being of the poorest quality and *vice versa.*

The following table shows the nature and number of the samples collected, and the localities from which they were obtained. Few samples were procured in Albany, nearly half of those reported upon last year having been purchased in this city. The average cost of samples, including collector's traveling expenses and *per diem*, has been twenty-two and seven-tenths cents. To some extent already the analysts have, through their collectors, had samples procured for each other, thereby obviating the necessity of sending a collector to distant parts of the State, and, as the work is extended over the State, this course will be more largely followed, both time and expense being thus saved. Exhaustive analyses of the samples were not generally required, but in most cases at least one quantitative determination was necessary. The pharmacopœial tests and analytical processes were generally followed.

TABLE.

ARTICLE.	PLACE WHERE PURCHASED.														Total number.
	Albany.	Ballston.	Catskill.	Cohoes.	Green Island.	Kingston.	Mechanicville.	Newburgh.	Po'keepsie.	Saratoga.	Schenectady.	Troy.	Utica.	West Troy.	
Ammonium, carbonate of	..	5	..	..	..	..	2	..	..	..	..	..	..	..	[illegible]
Chloroform, purified	..	5	5	4	1	4	2	12	8	4	..	..	10	3	[illegible]
Ether, stronger	..	5	4	5	1	4	2	13	8	4	..	..	10	3	[illegible]
Iron, tinct. chloride of	1	..	..	..	..	..	..	..	..	..	..	12	..	..	[illegible]
Lime water	..	..	4	..	..	4	..	..	..	..	6	..	..	..	[illegible]
Magnesia	..	..	..	..	..	..	..	11	..	..	..	..	..	..	[illegible]
Potassium, iodide of	..	..	..	..	2	..	..	..	8	4	..	..	10	3	[illegible]
Saffron (*Crocus*)	1	..	..	..	..	..	..	..	..	..	..	12	..	..	[illegible]
Sulphur, precipitated	1	..	..	..	..	..	..	..	..	..	..	12	..	..	[illegible]
Sulphur, washed	..	5	4	..	1	4	2	10	8	4	6	..	10	3	[illegible]
Zinc, oxide of	..	.	..	..	..	..	..	10	..	..	..	..	..	..	[illegible]
Vinegar	..	..	..	..	..	..	..	..	12	12	..	..	..	..	[illegible]
Total	3	20	17	9	5	16	8	56	44	28	12	36	40	12	[illegible]

SUMMARY OF RESULTS.

Of the 306 samples examined they were classed as of:

Good quality	145 or 47.4 per cent.
Fair quality	55 or 18.0 per cent.
Inferior quality	71 or 23.2 per cent.
Not as called for	35 or 11.4 per cent.

It should be stated that the above percentages by no means represent the proportions of good, bad and indifferent drugs on the market and actually sold, since only those articles which were known to be frequently adulterated, or were suspected of being of improper quality, were collected. Had samples of drugs and pharmaceutical preparations been selected at random, the proportion of pure and good articles would have been much larger. The following were the articles examined:

1. DRUGS AND PHARMACEUTICAL PREPARATIONS.

CARBONATE OF AMMONIUM. (*Ammonii Carbonas, U. S. P.*)

Seven samples examined of which No. 357 was of good quality; Nos. 354, 355, 356, 358 and 359 of fair quality, and No. 360 of inferior quality. Therefore, of good quality, one; fair, five; inferior, one. Examination included appearance, behavior when heated on platinum foil, solubility in dilute acids, tests for sulphates, chlorides, metals and empyreumatic substances and volumetric determinations of percentage purity, which were as follows:

Number 354	79.28
Number 355	77.93
Number 356	91.64
Number 357	95.07
Number 358	89.79
Number 359	75.74
Number 360	78.73

Average of the seven samples, 82.59 per cent.

Carbonate of ammonium is a readily decomposable salt, and to preserve this important medicinal agent in good condition it must be kept "in well-stopped bottles and in a cool place" (U. S. P.). The results of the above analyses show that it is often carelessly kept and partly decomposed when offered for sale.

PURIFIED CHLOROFORM. (*Chloroformum Purificatum, U. S. P.*)

Fifty eight samples, of which Nos. 195, 198, 201, 205, 210, 221, 223, 224, 227, 228, 265, 266, 267, 268, 293, 294, 296, 297, 298, 299, 333, 334, 335, 336, 337, 338, 339, 361, 364, 365, 380, 381, 406, 407, 408, 409, 411, 412, 413 and 415 were of good quality;

Nos. 197, 206, 226, 300, 362 and 363, of fair quality; and Nos. 208, 222, 225, 295. 301, 302, 378, 379, 410, 414, 416 and 417 of inferior quality. There were, therefore, of good quality, 40; fair, 6; inferior, 12. Examination included appearance, odor, reaction, tests for chlorides and free chlorine, sulphuric acid test, determination of specific gravity, etc. Excellent chloroform is now made by a new process, the application of which has resulted in greatly lowering its price. In this process crude acetates (gray or brown acetate of lime) are subjected to destructive distillation by heating in iron retorts, the distillate consisting of an aqueous and oily liquid containing acetone, methyl-ethyl acetone, di-ethyl ketone and other products. This liquid is then either washed or subjected to fractional distillation and the purified liquid acted upon by chloride of lime dissolved in water and thus converted into chloroform. The U. S. P. requires a specific gravity of 1.485–1.490 at fifteen degrees C. (59 degrees F.) The specific gravities of the fifty-eight samples examined were as follows:

No. 195	1.488	No. 302	1.488
No. 197	1.4777	No. 333	1.485
No. 198	1.484	No. 334	1.487
No. 201	1.485	No. 335	1.487
No. 205	1.485	No. 336	1.485
No. 206	1.491	No. 337	1.486
No. 208	1.453	No. 338	1.485
No. 210	1.486	No. 339	1.484
No. 221	1.488	No. 361	1.486
No. 222	1.488	No. 362	1.482
No. 223	1.486	No. 363	1.486
No. 224	1.489	No. 364	1.487
No. 225	1.466	No. 365	1.486
No. 226	1.490	No. 378	1.464
No. 227	1.489	No. 379	1.474
No. 228	1.489	No. 380	1.484
No. 265	1.488	No. 381	1.489
No. 266	1.492	No. 406	1.489
No. 267	1.489	No. 407	1.489
No. 268	1.490	No. 408	1.487
No. 293	1.486	No. 409	1.489
No. 294	1.487	No. 410	1.487
No. 295	1.491	No. 411	1.490
No. 296	1.486	No. 412	1.490
No. 297	1.488	No. 413	1.481
No. 298	1.487	No. 414	1.486
No. 299	1.488	No. 415	1.491
No. 300	1.469	No. 416	1.491
No. 301	1.463	No. 417	1.460

STRONGER ETHER—(*Æther Fortior U. S. P.*)

Fifty-nine samples, of which Nos. 196, 200, 229, 233, 236, 272, 303, 305, 308, 311, 340, 341, 344, 346, 366, 368, 369, 383, 384, 418, 420, 421, 425, 427, 428 and 429 were of good quality; Nos. 202, 232, 235, 270, 307, 312 and 430 were of fair quality, and Nos. 198, 203, 204, 207, 211, 230, 231, 234, 269, 271, 304, 306, 309, 310, 342, 343, 345, 367, 382, 385, 419, 422, 423, 424 and 426 were of inferior quality, and No. 209 consisted of *spirit of nitrous ether*, sold through carelessness or ignorance, and labeled "Stronger Ether" There were, therefore, of good quality, twenty-six; fair, seven; inferior, twenty-five, and sold by error, one. Stronger ether being largely used as an anaesthetic ought to be of good quality, but these results show that an inferior quality is too often offered for sale. The examination included appearance, odor, reaction, specific gravity determination, etc. The U. S. P. requires a specific gravity not higher than 0.725 at 15 deg. C. (59 deg. F.) The specific gravities of the fifty-eight samples of ether examined are as follows:

No. 196	0.724	No. 312	0.722
No. 198	0.760	No. 340	0.724
No. 200	0.726	No. 341	0.723
No. 202	0.739	No. 342	0.753
No. 203	0.746	No. 343	0.761
No. 204	0.760	No. 344	0.726
No. 207	0.754	No. 345	0.765
No. 211	0.754	No. 346	0.723
No. 229	0.728	No. 366	0.726
No. 230	0.743	No. 367	0.756
No. 231	0.751	No. 368	0.724
No. 232	0.726	No. 369	0.724
No. 233	0.724	No. 382	0.728
No. 234	0.777	No. 383	0.724
No. 235	0.738	No. 384	0.725
No. 236	0.729	No. 385	0.749
No. 269	0.754	No. 418	0.728
No. 270	0.733	No. 419	0.759
No. 271	0.752	No. 420	0.724
No. 272	0.727	No. 421	0.729
No. 303	0.723	No. 422	0.773
No. 304	0.752	No. 423	0.752
No. 305	0.724	No. 424	0.764
No. 306	0.746	No. 425	0.723
No. 307	0.727	No. 426	0.753
No. 308	0.722	No. 427	0.723
No. 309	0.758	No. 428	0.725
No. 310	0.756	No. 429	0.725
No. 311	0.728	No. 430	0.725

TINCTURE OF CHLORIDE OF IRON — (*Tinctura Ferri Chloridi U. S. P.*)

Thirteen samples, of which Nos. 476, 479, 480, 482, 483 and 484 were of good, and Nos. 474, 475, 477, 478, 481, 485 and 498 of fair quality. Therefore, of good quality, six, and fair, seven. Examination included tests for nitric acid, ferrous salt, oxychloride, etc.

LIME WATER. (*Liquor Calcis, U. S. P.*)

Fourteen samples, of which Nos. 375, 376, 377, 390, 391, 392, 394, 395, 396, 398 and 399 were of good, and Nos. 374, 393 and 397 were of fair quality only, being partially carbonated by exposure to air. There were, therefore of good quality, eleven, and fair, three.

MAGNESIA. (*Magnesia, U. S. P.*)

Eleven samples, of which Nos. 444 and 449 were of good quality; Nos. 442, 443, 446, 448, 450 and 451 of fair quality; Nos. 441 and 445 of inferior quality, being largely carbonated, and No. 447 consisted of sulphate of magnesium, ignorantly sold for magnesia. Therefore, of good quality, two; fair, six; inferior, two, and sold by error, one. Magnesia is often carelessly kept and, therefore, partially or largely carbonated by exposure to air. It should be preserved in well closed vessels.

IODIDE OF POTASSIUM. (*Potassii Iodidum, U. S. P.*)

Twenty-seven samples, of which Nos. 237, 238, 240, 241, 243, 273, 275, 317, 321 and 322 were of good or satisfactory quality; Nos. 213, 214, 216, 239, 244, 274, 276, 313, 315, 316, 318, 319 and 320 of fair quality, and Nos. 212, 215, 242 and 314 of inferior quality. Therefore, of good or satisfactory quality, ten; fair, thirteen, and inferior, four. The examination included tests for excess of alkali, iodate, sulphate, etc. Very little of the iodide of potassium on the market answers perfectly to the pharmacopœial requirements, having generally an excessive alkalinity and often containing decided traces of iodate, chloride and sulphate. The best looking samples, showing the handsomest crystals, are by no means always the purest.

SAFFRON. (*Crocus, U. S. P.*)

Thirteen samples, of which *twelve* were spurious, Nos. 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496 and 497, and but *one* genuine, No. 500. The practice of selling "safflower" (*Carthamus tinctorius*) for crocus, or real saffron, which consists of the stigmas of *Crocus sativus*, and is sometimes denominated "Spanish saffron," is very general but is nevertheless inexcusable, especially when the article is called for by its officinal name and in writing. The pharmacopœia does not recognize safflower at all, and when crocus is called for either the real article should be furnished or, if not kept in stock, the fact should be stated; and if safflower is offered in

its stead it should be explained that it is not the article demanded, but a common substitute therefor. Without such an explanation the substitution betokens either ignorance or willful wrong-dealing on the part of the seller. In but one case (No. 491), of the twelve reported above, was such an explanation made.

PRECIPITATED SULPHUR. (*Sulphur Præcipitatum, U. S. P.*)

Thirteen samples examined, of which Nos. 466, 467, 471 and 499 were pure and of good quality; No. 469 of fair quality, containing a small amount only of sulphate of lime, and Nos. 462, 463, 464, 465, 468, 470, 472 and 473 were of inferior quality, containing nearly half their weight of sulphate of lime. This was quantitatively determined in three samples and found to be as follows: No. 463, forty-four per cent; No. 464, forty-seven per cent; No. 470, forty-five per cent. Therefore, in the thirteen samples there were of good quality, four; fair, one, and inferior, eight. This article is probably in all cases purchased direct from manufacturers or wholesale dealers and not prepared by the pharmacist. There are two varieties in the market, the common *lac sulphur* and the *pure precipitated.* The sulphate of lime which makes up so large a proportion of the former is the result of an improper method of manufacture purposely adopted and, therefore, amounting to intentional adulteration, and since the pure article may be obtained by the retailer at a slightly higher price and can, moreover, be readily distinguished from the adulterated article by the application of a very few simple tests, laid down in the pharmacopœia, and in most cases by its appearance alone, it is evident that the retailer is not exempt from responsibility in the matter, for it is clearly his duty to know the nature and quality of the articles in which he deals. The term "lac sulphur" is not recognized in the U. S. P. and the sale of this impure article for the pharmacopœial preparation, which is as readily obtainable, is in every way to be condemned.

WASHED SULPHUR. (*Sulphur Lotum, U. S. P.*)

Fifty-seven samples were examined, of which Nos. 218, 220, 247, 249, 250, 251, 277, 279, 280, 323, 326, 331, 332, 347, 348, 349, 350, 352, 353, 372, 386, 389, 400, 401, 402, 405, 436, 437, 438, and 439 were of good quality; Nos. 325, 327, 328, 431, 434 and 435 were of inferior quality, and Nos. 217, 219, 245, 246, 248, 252, 278, 324, 329, 330, 351, 370, 371, 373, 387, 388, 403, 404, 432, 433, and 440 consisted of precipitated sulphur sold through ignorance or carelessness. Of these Nos. 278, 388, and 404 were of of good quality; No. 370 of fair quality, and the other seventeen were largely adulterated with sulphate of lime. Of the fifty-seven samples tested, therefore, there were of good quality, thirty; inferior, six; and twenty-one did not consist of the article called for, all but four of these being largely adulterated as well.

Washed sulphur was selected for collection not because it is in itself a very important drug, but because the unpurified "flowers of sulphur" is often sold for it, or, if the washed sulphur is not in stock, the retailer may substitute precipitated sulphur. Washed sulphur has the natural acidity of the sublimed sulphur (flowers of sulphur) removed by proper treatment with water of ammonia and subsequent washing. It is an article easily prepared by the pharmacist or obtained from reliable wholesale dealers or manufacturers, and there is no reason why an impure article, or a different article, should be substituted for it, as is shown frequently to be the case.

OXIDE OF ZINC. (*Zinci Oxidum, U. S. P.*)

Ten samples examined, of which Nos. 454, 456, 458, 459, 460, and 461 were of good quality; Nos. 452, 453 and 455 of fair quality. and No. 457 of inferior quality, containing a considerable quantity of the carbonate. Therefore, of good quality, six; fair, three, and inferior, one. The examination included tests for carbonates, lead and copper, iron, aluminum, etc.

II. VINEGAR.

The twenty-four samples of vinegar examined were collected in Saratoga and Poughkeepsie in March and April, before the passage of the new vinegar law previously referred to. Twelve samples were obtained in each place. Of the total number eight or thirty-three and three-tenths per cent, contained four and one-half per cent, or over, of absolute acetic acid, and in this respect conformed to the present legal requirement, while sixteen, or sixty-six and seven-tenths per cent, contained less than this amount and fell below the standard. Of these, four, or sixteen and seven-tenths per cent of the whole, contained between four and four and one-half per cent of absolute acetic acid, and may be considered of fair quality. The highest percentage of acid was five and one-half per cent (in two cases), and the lowest two and one-tenth per cent, the average being four per cent, which is the same as that found last year in the examination of seventy-four samples. The following table shows the acidity of each:

	Acetic acid.		Acetic acid.
No. 253........	3.6 per cent.	No. 281........	3.7 per cent.
No. 254........	3.7 per cent.	No. 282........	3.2 per cent.
No. 255........	4.9 per cent.	No. 283........	5.5 per cent.
No. 256........	4.6 per cent.	No. 284........	4.0 per cent.
No. 257........	5.1 per cent.	No. 285........	3.7 per cent.
No. 258........	2.1 per cent.	No. 286........	3.3 per cent.
No. 259........	4.1 per cent.	No. 287........	4.7 per cent.
No. 260........	3.2 per cent.	No. 288........	4.7 per cent.
No. 261........	4.2 per cent.	No. 289........	3.7 per cent.
No. 262........	5.5 per cent.	No. 290........	2.7 per cent.
No. 263........	4.3 per cent.	No. 291........	5.0 per cent.
No. 264........	3.1 per cent.	No. 292........	3.8 per cent.

During the period covered by this report thirty samples of water have been analyzed for the Board or for local boards of health; also two samples of sewage. Three samples of French canned peas and one of beans have been examined, and the amount of copper in the same determined. No samples of kerosene oil have been submitted. Forty-three samples of drugs and food articles have been collected for the other analysts, and forty-five samples of drugs received from them.

During the coming year it is proposed to continue the work on the same general plan as heretofore. Samples will be collected in new localities and in distant portions of the State with the aid of the collectors of the other analysts. Dealers from whom goods of inferior quality have been received will be again visited that it may be determined whether proper attention has been paid to previous notifications. In conclusion, it is believed that the general effect of the work done during the past sixteen months has had a decided influence in improving the quality of the drugs sold in this State. Druggists have not been distressed by a too rigid enforcement of the law, nor had their business injured by the giving of publicity to facts so far obtained, but the work done has been rather advisory and calculated to awaken in them a new sense of their responsibility. They have been fully informed as to the provisions of the law and where errors have been committed or improper articles dispensed, they have been fully informed of the facts, and if not themselves directly responsible have had an opportunity to complain to those wholesale dealers or manufacturers from whom their goods were purchased. This has resulted in improving the quality of many pharmaceutical products, and this is the effect which it is desired to produce, and which may speedily be accomplished if manufacturers and dealers, large and small, will co-operate with the Board in their attempts to raise the standard of drugs and medicinal preparations generally.

All of which is respectfully submitted,

WILLIS G. TUCKER,
Analyst.

Chemical Laboratory of the Albany Medical College, Albany, N. Y., December 17, 1886.

REPORT OF PROF. G. C. CALDWELL, PUBLIC ANALYST.

CHEMICAL LABORATORY, CORNELL UNIVERSITY,
December 14, 1886.

Dr. LEWIS BALCH, *Secretary of the State Board of Health:*

SIR.—My work on alkaloidal medicinal preparations since my last report, made February 10, 1886, has been confined to the examination of preparations of quinine.

METHODS OF ANALYSIS.

The two methods of assaying quinine pills, mentioned in the table below are described in my previous report. (Sixth Annual Report of the State Board of Health, page 374.) For the assay by the solution method, a quantity of pills, representing in all my more recent examinations 100 grains of the sulphate, is digested at a gentle heat with about fifty cubic centimeters of water strongly acidified with sulphuric acid, till the solution is as clear as it is possible to make it; if not clear or nearly so, it is passed through a filter in a funnel surrounded with boiling water, and the filter is washed as long as a drop of the washings has any bitter taste.

If, as is usually the case, the total volume of liquid thus obtained is too large, it is evaporated down to thirty or forty cubic centimeters and weighed in the flask in which it was received. Carefully weighed portions of about twelve grammes of this solution are then taken for each assay, the weighing being most conveniently done in the specific gravity pipette of my own device.

The assay tube that I now use has a bulb at its closed end, of a capacity of about twenty cubic centimeters and the graduated tube above it has about the same capacity. On the addition of the ammonia to the concentrated solution in the assay tube, and the consequent production of a thick precipitate of quinia entirely filling the liquid, the complete admixture of the reagent and precipitation of the alkaloid is much more easily affected in this bulb than is possible in a simple tube; furthermore, after the addition of the ether, holding the tube bulb uppermost, the etherial solution just about filling it, and the aqueous solution of the other constituents of the pills just coming up to the neck of the bulb, it is much easier than in a simple closed tube to effect complete solution, by a gentle rotary agitation, of any masses of undissolved quinia that collect at the line of separation of the two liquids, and also, by smart tapping of the bulb on the palm of the hand while this rotary agitation is kept up, to break up the glairy emulsion, entangling portions of the alkaloid, that is liable to be formed unless the mixture of aqueous solution and ether is very carefully made. I have found that violent shaking up of the contents of the tube is almost sure to

cause the production of so much of this emulsion, collecting in a thick layer between the two liquids, and of such a persistent character as to interfere seriously with the accuracy of the readings of the volume of ethereal solution left in the tube after the second extraction; therefore in order to bring the ether into thorough contact with the aqueous solution I simply invert the tube several times, thus allowing the liquids to flow through and past each other quietly.

Two ethereal extractions are made in each assay, the first one being collected in one flask, and the second in another; the weight of the dried quinia in the second flask being found from the total volume of the second portion of ether in the tube and the volume of that portion remaining after the drawing off, the total weight of quinia in the whole of the second extraction is calculated, and added to the weight obtained in the first extraction.

The ethereal solution is conveniently drawn off by substituting for the cork with which the tube is closed during the extraction, another cork carrying two tubes arranged like those of an ordinary wash-bottle; the longer one is very slender, and is pushed down till its mouth is as close to the surface of the aqueous solution as it can be without risk of taking up some of that solution, or of the foamy layer above it, if there be any; the ether is then blown out into the weighed flask designed for its reception.

The assay of the citrate of iron and quinine was conducted in the same manner, except that a weighed portion of about seven grammes was dissolved directly in the assay tube.

Squibb's stronger ether was always used, or the ether recovered by distillation from previous assays for which this ether had been used; a whiter and cleaner residue of quinia was obtained than with common ether. The residues of alkaloid were dried for at least two hours at 110 degrees–115 degrees C.; they were usually slightly yellow, and, rarely, of a much darker color when dry, showing that some impurities are occasionally taken up by the ether.

This method of assaying quinine pills is so much more convenient than what I have called the dry method as described by Mr. H. B. Parsons, in which an intimate and finely pulverized mixture of the pill mass and lime is exhausted with ether, that I have used the dry method only in a few cases, and generally as a check on the other method. I am not convinced that it is any more accurate; while the ethereal extract obtained is always perfectly clear, the solution in dilute sulphuric acid of the residue left in the flask after expelling the ether is always more or less turbid, showing that this residue is not all quinia. The corresponding solution of the quinia residues obtained by the other method are also usually turbid, but nearly always much less so. For another important, although rarely occurring possible source of error in the use of the dry method, I may refer to my last report in the sixth annual report of this Board, as well as for other criticisms, and also for an account of some tests of the solution method.

Mr. H. B. Parsons, on the basis of over a thousand determinations of water in the crystallized quinine sulphate of the trade, giving an average of 13.85 per cent, concluded that an allowance of seven molecules of water of crystallization, or 14.45 per cent, is sufficient and just. The United States Ph rmacopœia allows eight molecules, or 16.18 per cent. In order to give the manufacturers of preparations of quinia all the margin that is sanctioned by any authority, I have in my more recent assays of pills calculated from the quinia, found the crystallized sulphate with this higher per centage of water, although justice would be done to the consumer if the lower percentage was used. The difference between the results calculated with the lower and the higher amounts of water is small, and by no means enough to make a pill of full weight of quinia out of one that is seriously short.

The crystallized sulphate loses water so rapidly unless kept in tight vessels that I have not determined the water in the samples collected in August; they were brought to me in paper wrappers, and assays for water would have had no value. The assays that are reported of a few samples collected later, and protected from loss of weight while in transitu, show how widely the proportion of water may vary in the stock of the druggist.

KERNER'S TEST OF PURITY OF THE QUININE SULPHATE.

To prepare the quinine sulphate from a sample of pills or citrate for the application of Kerner's test, ammonia was added to the boiling dilute sulphuric acid solution of the residues of quinia obtained in the assays till the solution was slightly alkaline; the crystalline precipitate obtained on cooling was collected on a filter and washed with a saturated solution of pure quinine sulphate, and completely dried at 100 degrees C. A carefully weighed quantity of °.84 gm. of this anhydrous salt was treated as directed in the United States Pharmacopœia, 1880, page 279, with special care to maintain the temperature of the water at fifteen degrees, as well as in the measurement of the quantity of water added, the time of maceration, the quantity solution filtered off, and of ammonia added. Mr. Parsons has shown that all these precautions must be scrupulously observed, in order that the results obtained may be depended upon. In several instances such a thick magma was yielded on adding the ten cubic centimeters of water, that it was impossible to filter off as much as five cubic centimeters for the final test; it became necessary to add two or more additional cubic centimeters of water during the maceration; nearly always in such cases the final test indicated the presence of much foreign alkaloids. Some of the phenomena presented in the course of my experience with this test, excite some distrust of it even when carried out with all the care that is possible; if performed simply as directed in the United States Pharmacopœia, I think it would in some cases mislead the operator.

ASSAY OF QUININE PILLS.

Number of samples.	Purchased.			Said to be put up by.	Grains of Crystalized Sulphate of Quinia per 100 Pills.					Contains excess of foreign alkaloids so far as indicated by Kerner's test.
						Found on Analysis.				
						By the solution method.		By the dry (Parson's) method.		
	Date.	Of whom.	Where.		Claimed.	Assay I.	Assay II.	Assay I.	Assay II.	
	1885.									
23	December	Tupper & Whiting	Binghamton	L. J. Finch	200	188.2	187.5	......	......	Very much.
	1886.									
24	February 23	C. C. Platt	Ithaca	E. Lilly	200	195	194.8	......	......	None.
25	February 23	G. W. Schuyler	Ithaca	W. H. Schieffelin	200	197.6	199.2	......	......	None.
26	February 26	H. Johnson	Elmira	W. Warner	200	197.2	196.7	......	......	Much.
27	February 26	Bartholemew	Elmira	A. E. Gould	200	168.9	169.1	......	......	Not tested.
28	February 26	J. F. Van Nort, Jr.	Elmira	McIntyre & Embury	200	176	182	171.9	......	None
29	February 26	J. Meyer, Jr	Elmira	F. Stearns	200	166.5	165.7	......	......	None.
30	March 12	Pratt's Pharmacy	Syracuse	Hall & Ruckel	300	260.4	255.3	264.9	......	None.
31	March 12	W. D. Tallmann	Syracuse	H. A. Thayer	200	226	226	......	......	Much.
32	March 12	Hubbarb & Moore	Syracuse	W. S. Merrill Chemical Co.	100	101.2	99	......	......	None.
33	March 12	Moore & Baldry	Syracuse	C. E. Daniels	200	173.7	171.2	......	......	None.
34	March 12	E. W. Thomas	Syracuse	Wyeth & Co	300	252.6	252	257	......	None.
35	March 12	Hubbard & Moore	Syracuse	J. E. Moore	200	172.7	177.9	177.1	......	Much.
36	February 26	Hooker & Dow	Elmira	Park, Davis & Co.	200	187.9	......	183.9	......	None.
37	March 12	P. L. Ryan	Syracuse	Sharp & Dohme	200	188.9	193.6	......	......	None.
38	May 15	A. Niederprueen	Rochester	A. Niederpruen	200	133.5	134.3	......	......	Much.
40	May 15	H. Haas	Rochester	H. Haas	200	165.5	163.9	......	......	Doubtful.
42	May 15	J. Esterheld	Rochester	J. Esterheld	300	299.5	297.6	......	......	Very little.
43	May 15	J. M. Schmitt	Rochester	J. M. Schmitt	300	299.2	295.7	......	......	None.
44	May 15	F. Zimmerman	Rochester	F. Zimmerman	300	299.5	300.6	......	......	Much.
45	May 15	C. W. Wagner	Rochester	McIntyre & Embury	300	261.9	262.8	......	......	Much.
46	May 15	A. N. Braman	Rochester	A. N. Braman	200	201.7	203.8	......	......	None.
47	May 15	S. A. Newman	Rochester	S. A. Newman	300	242.5	238.1	......	......	None.
48	May 15	C. W. Wagner	Rochester	Tilden & Co.	300	246	246.1	......	......	None.
49	May 15	H. Fellman	Rochester	H. Fellman	300	295.8	293.5	......	......	None.
50	May 15	L. Klinzing	Rochester	L. Klinzing	300	290	295.5	......	......	Doubtful.
51	May 15	R. W. Chambers & Co.	Rochester	R. W. Chambers & Co.	300	142.8	143.6	......	......	A little.
52	May 15	A. R. Mandeville & Co.	Rochester	A. R. Mandeville & Co.	300	255.4	255.8	......	......	None.
53	May 15	J. A. Zobrist	Geneva	Keasbey & Mattison	300	268	264.6	......	......	Much.

ASSAY OF QUININE PILLS — (*Continued*).

Number of samples.	PURCHASED. Date.		PURCHASED. Of whom.	PURCHASED. Where.	Said to be put up by.	Claimed.	GRAINS OF CRYSTALIZED SULPHATE OF QUINIA PER 100 PILLS. FOUND ON ANALYSIS. By the solution method. Assay I.	By the solution method. Assay II.	By the dry (Parson's method. Assay I.	By the dry (Parson's method. Assay II.	Contains excess of foreign alkaloids so far as indicated by Kerner's test.
	1886.										
54	June	16	A. B. Huested	Albany	A. B. Huested	200	206.4	206.9			None.
55	June	16		Albany	P. J. Noyes	200	165.2	166.7			Very little.
56	June	16	C. H. Gaus	Albany	Upjohn Pill and Granule Co.	200	193	193.2			Very little.
57	June	30	J. G. Bissell & Co.	Rome	Bullock & Crenshaw	200	196.8	196.5	187.6		None.
58	June	30	J. W. Cone	Utica	J. W. Cone	300	293.9	294.5			None.
59	June	30	W. Blaikie	Utica	W. Blaikie	300	293	292			None.
60	July	3	J. N. Steel	Auburn	J. N. Steel	300	2-5.9	283			A little.
61	July	2	C. H. Butler	Oswego	C. H. Butler	300	324.3	325.3			Some.
63	July	20	W. S. O'Brien	Buffalo	W. S. O'Brien	500	443.2	441.8			None.
64	July	21	C. Rodenbach	Buffalo	Lehn & Fink	300	284.6	283.7			None.
65	July	20	Lyman & Jeffrey	Buffalo	Lyman & Jeffrey	200	200.3	203.4			Some.
66	July	19	H. E. Griffith	Niagara Falls	H. E. Griffith	200	191.2	190.8			None.
68	July	23	H. G. Pierson	Hornellsville	H. G. Pierson	200	182.6	179.3	198.2	198.6	Very much.
69	July	22	R. K. Smither	Buffalo	R. K. Smither	500	477.1		478.6		Some.
70	July	21	J. Thomas	Buffalo	J. Thomas	200	194.4	186.9			Some.
74	August	17-21	E. L. Ostrom	Binghamton	E. A. Gould & Co.	500	441.8	442.6			Very much.
76	August	17-21	Otis Bros.	Binghamton	Park, Davis & Co.	500	470.5	467.4			Very little.
77	August	17-21	J. E. Mills	Middletown	McKesson & Robbins	500	474.2	452	488.8		None.
78	August	17-21	J. E. Mills	Middletown	J. E. Moore	200	145.2	150.9			Very much.
79	August	17-21	J. E. Mills	Middletown	E. Lilly & Co.	100	95.6	96.2			Very much.
83	August	17-21	C. A. Johnson	Middletown	Bruen Bros. & Ritchie	200			178.8	177.4	Very much.
91	August	17-21	Valentine & Dean	Sing Sing	L. J. Finch	100	89.3	89.4			Some.
93	August	17-21	W. Turner	Poughkeepsie	W. R. Warner	100			98.6	98.3	Very much.
94	August	17-21	Barnes Bros.	Poughkeepsie	E. R. Squibb	200	204.5	205.4			Some.
95	August	17-21	E. C. Bolton	Poughkeepsie	Hall & Ruckel	200			179.6	183.4	None.
96	August	17-21	B. Stedman	Hudson	B. Stedman	200	206.1	204.1			Very much.
98	August	17-21	W. J. Miller	Hudson	W. H. Schieffelin	500	418.2	417.7			Much.
99	August	17-21	Rice Bros.	Hudson	Upjohn Pill and Granule Co.	200	204.4	203.4			Very much.
105	November	16	Ingraham Bros.	Elmira	McIntyre & Embury	200	181.9	181.4			Some.
108	November	16	J. F. Van Nort, Jr.	Elmira	McKesson & Robbins	500	474.9	476.3			None.
111	November	16	R. S. Gilkeson	Elmira	W. R. Warner	200	187.4	190.6			None.
128	November	9	Gauntlet & Brooks	Ithaca	Tilden & Co.	200	204.6	202.9			Much.
129	November	9	C. C. Platt	Ithaca	Park, Davis & Co.	200	194	193.4			None.

ASSAY OF CITRATE OF IRON AND QUININE.

Number of samples.	Purchased.			Said to be put up by.	Per Cent of Quinia found on Analysis.			Contains foreign alkaloids so far as indicated by Kerner's test.
	Date.	Of whom.	Where.		Assay I.	Assay II.	Assay III.	
	1886.							
39	May 15	O. J. Bryan	Rochester	Wyeth & Co	8.14	7.89	8.08	Much.
41	May 15	Lehn & Fink	New York	Lehn & Fink	7.22	7.23	......	Very much.
62	June 30	Graves & Reifert	Rome	Lazell, Dally & Co.	10.39	10.45	......	None.
67	July 20	Gregory's Pharmacy	Buffalo	Keasbey & Mattison	9.81	9.92	......	None.
75	August 17-21	Otis Bros	Binghamton	Mellinckrodt Chemical Co.	7.50	7.55	......	Very much.
81	August 17-21	A. Bull	Middletown	Billings, Clapp & Co.	10.24	10.70	......	Very much.
84	August 17-21	Olney & Fuller	Middletown	D. M. Stiger & Co.	9.28	9.49	......	Very much.
85	August 17-21	G. B. Wray	Yonkers	Rosengarten Sons	9.04	8.98	......	Very much.
86	August 17-21	T. A. Walsh	Yonkers	Fraser & Lea	7.37	7.57	......	Very much.
88	August 17-21	P. Mitchell	Yonkers	McKesson & Robbins	7.70	7.70	......	Much.
100	August 17-21	Lane & Paine	Rochester	Powers & Weightman	10.46	10.57	......	Much.
123	November 16	Bartholemew & Smith	Elmira	Powers & Weightman	9.53	9.53	......	Very much.

EXAMINATIONS OF SULPHATE OF QUININE.

Number of samples.	Purchased. Date.	Purchased. Of whom.	Purchased. Where.	Said to be put up by.	Per Cent of Water found on Analysis. Assay I.	Per Cent of Water found on Analysis. Assay II.	Per Cent of Water found on Analysis. Assay III.	Contains excess of foreign alkaloids so far as indicated by Kerner's test.
	1886.							
72	August 17-21	E. L. Ostrom	Binghamton	Powers & Weightman	4.76	4.78	.....	Much.
78	August 17-21	E. L. Ostrom	Binghamton	N. Y. Quinine and Chemical Co.	......	......	.....	Very much.
80	August 17-21	F. M. Pronk	Middletown	McKesson & Robbins	......	......	.....	Much.
82	August 17-21	A. Bull	Middletown	Keasbey & Mattison	......	......	.....	Very much.
87	August 17-21	T. A. Walsh	Yonkers	Lehn & Fink	......	......	.....	Very little.
89	August 17-21	Washburn Bros	Sing Sing	Chrinir-Fabrik, Braunschweig, Germany	......	......	......	Very much.
90	August 17-21	Valentine & Dean	Sing Sing	Lazell, Dally & Co	......	.....	......	Very little.
92	August 17-21	J. T. Joslin	Newburgh	W. H. Schieffelin	......	......	......	Much.
97	August 17-21	Hinsdale & Van Tassel	Hudson	C. F. Bohringer, Mannheim, Germany	......	......	......	Much.
116	November 16	T. S. Flood	Elmira	Lazell, Dally & Co	14.00	13.44	......	Some.
130	November 9	Gauntlet & Brooks	Ithaca	Powers & Weightman	5.39	5.25	......	Much.

NOTES AND COMMENTS ON THE PRECEDING TABLES.

Sample 47 gave, on a third assay, 236.9 grains; sample 51 137.4 grains; and sample 68 200.4 grains per 100 pills, all by the solution method. For some unknown reason much difficulty was experienced in the analysis of the last mentioned sample by the solution method, the results ranging in five assays from 119 to 200 grains per 100 pills.

In the case of samples 77 and 108, said to contain bisulphate of quinine, the quinia found on analysis was calculated to this salt, with seven molecules of water of crystallization.

REGISTRATION AND VITAL STATISTICS.

THE SCOPE OF THE WORK IN THE EXAMINATION OF MEDICINAL ALKALOIDAL PREPARATIONS.

On two of the strips taken by collectors for me, I have had inquiries made as to the extent of the demand for citrate of iron and quinine, for preparations of cinchonidia and quinidia, for morphine in prescriptions, and for the comparative demand for quinine in pills and in powder. The information thus obtained indicates so little use of cinchonidia and quinidia that it does not seem advisable to undertake any examination of the preparations of these alkaloids as sold by druggists. For citrate of iron and quinine the demand is small; but still some is sold in every town or city where the inquiries were made. Morphine enters largely into prescriptions, standing next to quinine in this respect.

The results of these inquiries accord with those of an analylsis of 7,000 prescriptions, in which 696 different substances are mentioned, given in the Proceedings of the Eighth Annual Meeting of the New York State Pharmaceutical Association. Quinidia is not mentioned at all; only °.66 per cent of the whole number consists of prescriptions containing cinchonidia; four per cent contain salts of morphine, and in nearly all cases the sulphate; if we include powdered opium, tincture of opium and other preparations we have ten per cent more, or a total of fourteen per cent; 9.7 per cent of the whole number of prescriptions contained salts of quinia

REPORT

OF THE

STANDING COMMITTEE ON REGISTRATION AND VITAL STATISTICS.

The existing laws affecting the organization and work of the Boards of Health in this State require that all births, deaths and marriages shall be formally reported to local boards; that by them thoy shall be registered and then forwarded to the office of the State Board where they shall be registered and filed. To secure the routine operations of such work, requiring the co-operation of reporters and registering officers of local boards, is a work of time. This is shown by its progressive character, for each year of the history of the Board has brought an increase in the number of certificates of births, deaths and marriages received. Much remains yet, however, to be done to enforce the observance of the law upon local boards. The law itself is amply sufficient to enable them to secure a record of all vital statistics in their respective territories. The text of the present law, passed May, 1885, and the needs of it, to which reference was made in the last annual report of this committee, may be found in the sixth annual report of the board.

The receipts of vital statistics for the twelve months of the year are as follows: Births, 37,062, deaths, 33,486 and marriages, 17,085; the entire number of certificates received during the year is 87,633. There have been registered up to the present time 140,000 births; 120,000, deaths and 63,000 marriages, in all 323,000 certificates.

Index volumes of these have been prepared, rendering the contents of the registers readily accessible.

The work of organizing and keeping active the local boards is one requiring constant attention, and progress has been made during the year. There are still a considerable number of towns in rural parts of the State which are not organized. Of the 348 incorporated villages, also, there are not a few that have not yet fully complied with the law requiring them to organize boards of health. Many of these latter, the smaller villages especially, leave their sanitary and registration work to the towns in which they are situated. Provisions exists in the law for this, by mutual agreement between the local boards and with the consent of the State board, and in many cases it has seemed desirable to suggest this as a simpler way of carrying on this work. Without this formal action the assumption of sanitary and registration work by town boards in the

limits of incorporated villages is not within the provisions of the present law.

The Monthly Bulletin of Mortality has been continued through the year and has furnished a record of the current history of disease in the State. Its value consists in showing the exact state of the public health, at short and regular intervals, and also in providing a mass of arranged statistics of a sort that is essential to progress in the study of public hygiene, to contribute to which in this and other ways should be the aim of every health organization.

In the investigation of the causes of epidemics during the year the record of mortality, made by the bulletin since 1884, has been used to throw light upon the conditions found, and in some cases, notably in that of an outbreak of diphtheria in Gouverneur, very effectively. The comparative prevalence of diseases in localities, of which heretofore no record has been kept in this State, except in a few of the large cities, is of immediate practical value in the work of preventive medicine, and when placed alongside of local conditions that are found assists very materially in the sanitary investigations of the board.

During the eleven months of the year that have been reported on in the Bulletin, at the time of writing this report, about 82,000 deaths have been recorded, 3,000 of these being under the head of delayed returns, having been received too late for tabulation. Doubtless the number of deaths in the entire State for the year is not far from 100,000; when the December returns have been received nearly 90,000 deaths will have been accounted for. The actual reported mortality is about 5,000 greater than in 1885, the increase being due to greater fullness in the returns and to the existence of a larger number of local boards of health. It is not possible to introduce in a State Bulletin of Health all those valuable minutiæ which enable conclusions of importance in the study of special diseases to be reached, and which can be incorporated in the health reports of cities (such as records of sex, occupations, races and social conditions); but in some respects a peculiar value attaches to the larger conditions, necessarily more generally stated, that can be tabulated in the State Bulletin. The infant death rate and the death rate from the various zymotic diseases may be taken as a measure of healthfulness and when in individual localities the local surroundings are added, much can be learned of immediate value and something contributed to the general knowledge of the subject. Of the 79,108 deaths that are tabulated in the eleven monthly issues of the Bulletin, 30,060 or about thirty-eight per cent, were of children under five years of age. This is a proportion of infant mortality slightly in excess of that of last year.

From zymotic or preventable diseases 16,840 deaths are reported, a per centage of 21.30. Under this class of diseases are specially tabulated, cerebro-spinal fever, typhus and typhoid fevers, malarial diseases, small-pox, scarlet fever, measles, erysipelas, whooping cough,

diphtheria and diarrhœal diseases. The first of these caused 522 deaths, and they occurred in all parts of the State and pretty uniformly in each month, the months of March, April, May and June having somewhat larger death rates. It is long since any epidemic outbreak of cerebro-spinal fever has made its appearance and it has not been specially noted in the sanitary work of the board during the year, save as its comparative prevalence in a locality has been inquired into for the purpose of securing added light on hygienic conditions. The factor of water saturation of the soil co existent with filth pollution, which is best established as the cause of its occurrence, is found much more abundantly in some sections of the State than in others. As this same cause, without doubt plays an important part in causing the occurrence of diphtheria, the interest in cerebro-spinal fever, even occurring infrequently, is heightened. There has not been found, however, in the board's experience for the year that there was any relative co-existence of the two diseases.

Typhus fever prevailed outside of the cities of New York and Brooklyn only in one locality, an outbreak of the disease having begun in the county penitentiary at Albany a little before the beginning of the year, and twenty-six of the forty-five deaths from the disease occurred there, in January and February, when the epidemic was brought to an end. The source of the introduction of the disease could not be traced. There was no spread of it from this point. From typhoid fever there were 1,057 deaths. Its prevalence in the late summer and through the fall corresponds with the usual observations.

The number of deaths from these respective diseases that occurred in each thousand deaths, from all causes, in 1886, and also in 1885, is shown by the following table:

RATE PER 1,000 DEATHS FROM ALL CAUSES.

	1885.	1886.
Typhoid fever	13.27	13.36
Diarrhœal diseases	90.80	87.50
Malurial diseases	11.64	10.29
Scarlet fever	14.72	11.91
Small-pox	0.41	0.43
Measles	14.55	5.84
Whooping cough	10.37	15.11
Diphtheria and croup	56.06	62.36
Conjoined rate of typhoid and diarrhœa	104.07	100.86

It appears that while the typhoid fever death-rate is about the same as that of last year, that from diarrhœal diseases is less, so that the conjoined death rate of the two classes of diseases is lower than that of 1885, and it is very much less than that of 1884, which rose to 131.07. In the last annual report of the secretary this lowering the death rate for typhoid fever and diarrhœa was

commented on as showing a better sanitary condition in the State in the direction of "public sanitary improvements, which are amenable to the efforts of local boards of health." It was estimated that such improvements would show in the prevention of this class of diseases. Emphasis was placed on this by contrasting their death rate with that from diphtheria, which "is probably in the majority of cases largely dependent upon filth-factors of an intra-domiciliary character — faults of construction, house-drainage, plumbing, etc., which are, in but small degree, affected by public sanitary improvements." This reasoning, the logic of which has received added emphasis by the observations of the board during the year, is even more pertinent as bearing on the health conditions of the State by the still greater discrepancy between the death rates of these two classes of diseases in 1886 than in 1885. In 1884 the death rate from diphtheria and croup (which in vital statistics are classed as one) was 47.65 per 1,000 deaths from all causes; in 1885 it was 56.06, while in 1886 it was 62.36.

This disease, which has been especially prevalent during the year, has occurred largely in local epidemics of comparatively short duration, several of which have been investigated by the board. Its distribution through the year may be seen in the table of mortality by months, which, as taken from the Bulletin, is introduced below. Epidemics, when extended in their prevalence, have been generally found to be due in the main to an extensively existing cause, the chief of which has been soil saturation and consequent defilement of the air of houses in villages, or to the insanitary condition of school buildings. The former of these is certainly of a character that calls for improvement of a public character, viz.: General drainage of the affected portion of the village site; but its possibility as a factor in the diseases depends, to a degree at least, on local or domiciliary conditions, and the extinction of the disease, which caused nearly 5,000 deaths during the first eleven months of the year, will not be effected until the people are educated to give reasonable care to the cleanliness of their homes and the exclusion of defiled air from them, the possibility of which is usually beyond question. Of the minor zymotic diseases, little needs to be noted beyond the showing of the table as to their prevalence. Whooping cough prevailed with rather unusual severity, particularly during the earlier portion of the year, and was the cause of about 1,200 deaths, and next to diphtheria was the most fatal of the diseases of this class. Important questions, as to the age and hereditary conditions and environment of the sick, cannot be shown by our records. Its fatality depends on these and is to be limited by their rectification, rather than by any attempt to prevent the disease, save as it may be desirable in connection with the public schools. Scarlet fever has been less frequent than for the last two years, although it has prevailed generally of mild type in numerous localities. Measles, having

been unusually prevalent in 1885, was very much less so in 1886 than for two years past.

Finally, small pox, which caused so large a mortality in 1885 in Montreal, and against which vigorous efforts to prevent its spread into this State were successfully made, has caused but three deaths in the State outside of New York and Brooklyn. In New York city a number of deaths, from it occurred during the early half of the year, and in the fall it appeared in Brooklyn, thirty-one deaths occurring during the eleven months in these two cities. In February, one death occurred from this cause in Albany, and in April, one each in Syracuse and the town of New Castle, Westchester county, among laborers upon the Croton aqueduct. There were in all about the same number of deaths from small pox in 1886 as in 1885. The immunity which the State has enjoyed during the two years past, especially considering the exposure from surrounding foci of the disease, is evidence of the protection afforded by vaccination.

The following table shows the totals of mortality, not only of the zymotic, but of all diseases, by months:

TOTALS OF MORTALITY BY MONTHS.

	Total number of deaths.	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.
January	6,747	2,252	....	28	24	66	53	3	138
February	6,288	2,011	....	42	7	57	66	7	119
March	7,918	2,552	....	63	5	75	78	6	119
April	7,181	2,281	....	63	3	69	75	8	129
May	6,659	2,044	....	55	..	45	75	5	116
June	6,316	2,229	....	57	1	39	50	2	74
July	9,376	5,021	....	44	..	75	61	....	49
August	7,142	3,312	....	49	1	104	66	....	43
September	7,239	3,206	....	42	1	176	74	....	36
October	7,370	2,730	....	32	1	194	118	2	51
November	6,872	2,423	....	47	2	157	98	1	68
Total	79,108	30,060	38.0	522	45	1,057	814	34	942

	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.
January	20	34	192	546	73	......	1,184	1,008	96
February	7	44	105	437	70	......	1,110	946	87
March	21	46	129	490	76	......	1,590	1,129	106
April	32	49	123	380	89	......	1,188	1,125	90
May	37	43	89	394	123	.....	885	1,085	73
June	56	24	72	380	465	193.65	626	911	71
July	80	10	114	384	2,696	374.68	541	949	56
August	45	11	134	307	1,484	......	480	861	58
September	26	19	100	324	1,186	......	497	919	61
October	53	17	88	618	493	......	845	985	50
November	185	18	49	675	166	......	1,056	982	70
Total	462	315	1,195	4,933	6,921	213.00	9,952	10,900	821

	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
January	332	327	464	717	142	232	485	673
February	324	347	431	687	157	222	461	555
March	395	418	474	853	193	234	660	758
April	353	385	483	830	173	251	550	733
May	355	363	443	711	186	331	445	860
June	382	323	470	714	189	298	397	702
July	646	357	449	907	166	673	480	939
August	528	330	309	657	153	266	458	798
September	588	352	386	674	165	298	474	843
October	497	366	407	692	193	294	549	825
November	328	361	448	576	166	264	494	661
Total	4,728	3,929	4,764	8,018	1,883	3,083	5,453	8,337

Of other causes of death than those resulting from zymotic diseases, none presents more interest to the sanitarian than consumption. This is chiefly because there is now no question that consumption is to a degree itself a preventable disease, and while this preventability lies partly in conditions that are to be overcome only by personal and individual effort on the part of the subject of them, it is well established as a sanitary fact that it can be very considerably affected by public sanitary engineering. In the eleven months of 1886 there were 10,900 deaths from this, which represents a death rate to each 1,000 total mortality of 137.79. This is nearly the same as it was in 1885. In most of the sanitary districts into which the State is divided, there is much uniformity in the death rate from consumption, the southern tier district alone showing very marked variation from the general average, the ratio per 1,000 deaths being 102.70; the record of 1885 shows the same low death rate in this district compared with the rest of the State. The Lake Ontario and Western district is also lower than the general average of the State, which was likewise true of it in 1885. The death rate from consumption for deaths occurring above the age of five years is 222.22. The conjoined death rate of consumption, zymotic diseases and puerperal diseases (of which an indefinite proportion are, without doubt, zymotic in origin), is 361 per 1,000, or a little more than one-third of the total mortality.

From acute respiratory diseases the death rate per 1,000 was 125.80. In 1885, the early months of which were marked by the extensive prevalence of pneumonia, the death rate was 135 per 1,000.

Of the remaining causes of death, there is no need of comment; they vary but little from the records of previous years. As a whole it may be said that a satisfactory degree of healthfulness has existed, estimating by standards of health as far as past years have shown. The State has escaped serious epidemics of more easily preventable diseases. The committee would, however, emphasize the fact that a great deal can yet be done in effecting sanitary improvements which must materially lessen the death rate from diseases which in an ideally perfect sanitary condition will not exist. These improvements need not be in the direction of experimental work, but along the line of common improvements, the efficiency of which is perfectly well established. They are in the simple and plain matters of drainage of the soil, removal of waste, purity of drinking water and common cleanliness. The difficulty in effecting them lies in the ignorance of the people on sanitary matters, their indifference to and lack of appreciation of their value and failure to learn the lesson which is constantly enforced upon the board by observation of causes and effects of bad hygiene and preventable disease. The strenuous efforts of the board are being constantly made to educate local boards of health and the people

generally upon these things and to weaken their indifference to their importance, and it is a cause of congratulation that in many localities their efforts have been rewarded, and that to such a degree that the summary of the statistics of mortality, year by year, for the entire State exhibits a material improvement in the death rates from the diseases that under favoring conditions are certainly to be properly designated and regarded as preventable.

MONTHLY BULLETINS.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during January, 1886.

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The populations preceded by a star (*) are estimated to date; the remainder are from the census of 1880.]

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	2,979	25.58	1,180	39.5	14	2	12	26	8	49	5	12	70	252	33	360.00	590	490	41	†124	†172	†167	263	54	106	237	252
BROOKLYN	*665,600	1,268	22.86	502	39.5	0	0	10	15	0	46	1	5	19	125	15	186.12	258	145	20	61	51	68	148	20	30	20	305
Gravesend	5,000	6	14.40	2	33.3	0	0	0	0	0	1	0	0	0	0	0	166.67	2	1	0	0	0	0	0	0	1	0	1
New Lots	20,000	25	15.00	7	28.0	0	0	0	2	0	0	0	0	0	2	0	160.00	4	4	0	1	0	4	2	0	2	0	4
New Utrecht	4,742	4	10.12	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	0	1	0	0	0	0	2
LONG ISLAND CITY	*21,000	35	20.00	13	37.1	0	0	1	0	0	0	0	0	1	2	2	171.43	9	7	0	1	3	1	1	1	0	4	2
Newtown	*10,000	21	25.20	10	47 6	0	0	1	0	0	1	0	0	0	2	0	190.47	5	5	0	0	0	1	1	1	1	0	3
Oyster Bay	*12,000	19	19.00	4	21.0	0	0	0	0	0	0	0	0	1	0	0	52.63	3	2	0	2	2	2	3	2	0	1	1
North Hempstead	8,000	8	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	0	1	2	0	0	0	0	0
Babylon	4,739	2	5.07	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	0
Southold	7,267	16	26.48	2	12.5	0	0	0	1	0	3	0	0	0	1	0	333.33	0	2	0	0	0	0	3	0	2	3	1
Sag Harbor	3,000	6	24.00	2	33.3	0	0	0	0	0	1	0	0	0	0	0	166.67	0	1	0	1	0	0	1	0	0	0	2
Northfield	7,014	10	17.14	5	50 0	0	0	0	0	0	2	0	0	0	0	0	200.00	2	0	0	2	1	0	0	[illegible]	0	0	2
Westfield	5,289	14	31.60	4	28.5	0	0	0	0	0	0	0	0	0	1	0	71.42	1	7	0	0	0	2	1	0	1	0	1
YONKERS	*22,000	40	21.85	15	37.5	0	0	1	0	0	0	0	0	1	2	0	100.00	7	6	1	1	2	2	4	1	2	2	8
Westchester	*6,900	11	19.13	2	18.2	0	0	0	0	0	2	0	0	0	1	0	272.73	1	1	0	0	0	3	0	0	0	2	1
Mount Vernon	*5,000	6	14.40	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	1	0	1	0	0	1	1
Rye	3,500	5	17 14	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	3	0	0	0	0
Sing Sing	*6,500	13	24.00	5	38.4	0	0	0	0	0	0	0	0	0	4	0	307.70	0	2	0	0	0	2	2	1	0	1	1
New Rochelle	5,276	7	15.73	2	28.6	0	0	0	0	0	0	0	0	0	3	0	428.57	0	0	0	0	0	0	2	0	1	0	1
Rest of District	....	85	....	32	37.6	0	0	0	1	0	8	0	0	3	2	0	105.88	11	18	0	7	4	2	16	8	4	4	7
HUDSON VALLEY DIST:																												
ALBANY	96,000	215	26.87	47	21.9	4	21‡	4	0	0	[illegible]	[illegible]	1	0	25	2	306.98	23	27	1	18	7	24	11	9	4	10	15
COHOES	*20,000	46	27.60	18	39.1	0	0	2	0	0	6	2	0	1	7	0	391.30	4	7	0	4	0	1	7	1	0	1	3
West Troy	13,000	30	27.70	8	26.7	0	0	3	0	0	0	0	0	0	5	0	300.00	7	2	0	1	1	1	3	2	1	1	2
Hoosick Falls	4,000	5	15.00	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	3	0	0	0	1
TROY	*60,000	97	19.20	21	21.9	0	0	3	0	0	[illegible]	1	1	2	6	1	185.46	15	18	4	6	5	12	8	2	5	4	4
Lansingburgh	*9,700	11	13.37	2	20.0	0	0	1	0	0	0	0	0	0	0	0	100.00	1	1	0	1	0	5	0	0	0	2	0
Green Island	*5,000	6	14.40	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	1	0	0	0	1	2

Greenbush	7'00	12	20.00	4	33.3	0	0	0	0	0	1	0	0			0	250.00	1	2	0	1				0	2	0	1
Catskill	*4,500	10	26.67	2	20.0	0	0	0		0	0	0	0				200.00	0	4	0	0	0	0	3	0	0	0	1
HUDSON	*10,000	18	21.60	3	16.7	0	0	1		0	0	0	0	0	0	0	55.56	0	6	0	6	0	2	1	0	0	2	0
KINGSTON	21,100	33	18.77	6	18.2	1	0	0	1	0	0	0	0	0	2	1	151.51	1	9	0	3	2	5	2	1	1	4	0
Wawarsing	8,547	5	7.02	2	40.0	0	0	1	0	0	0	0	0	0	0	0	200.00	0	2	0	0	0	0	0	0	0	2	0
Rosendale	5,000	5	12.00	1	20.0	0	0	0	1	0	0	0	0	0	0	0	200.00	0	0	0	0	0	0	3	1	0	0	0
Marbletown	4,000	7	21.00	4	57.1	0	0	0	0	0	0	0	0	0	1	0	142.85	1	2	0	0	0	0	0	1	0	0	2
Esopus	4,736	7	17.74	1	14.3	0	0	0	0	0	0	0	0	0	2	0	285.56	2	0	0	0	0	1	0	0	0	1	1
Saugerties	*4,000	13	39.00	7	53.8	0	0	0	0	0	0	0	0	0	9	0	692.31	1	0	0	0	0	0	1	0	0	0	2
POUGHKEEPSIE	20,200	27	16.04	5	18.5	0	0	0	0	0	0	0	0	0	2	0	74.30	1	5	0	1	1	2	5	2	0	7	1
Fishkill	10,732	8	9.00	1	12.5	0	0	0	0	0	0	0	0	0	1	0	125.00	3	0	0	0	0	1	1	0	0	1	1
Wappinger Falls	5,000	6	14.40	1	16.7	0	0	0	0	0	1	0	0	0	0	0	166.67	0	2	0	1	0	0	0	2	0	0	0
NEWBURGH	20,000	31	18.60	7	22.6	0	0	0	0	0	0	0	0	0	0	0	....	4	3	2	2	2	4	6	1	0	2	5
Port Jervis	9,000	7	9.33	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	2	1	1	0	0
Middletown	10,000	17	20.40	4	23.5	0	0		0	0	0	0	0	0	0	0	58.82	3	3	0	2	0	0	4	0	0	2	2
Goshen	4,387	8	21.88	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	1	0	2	0	0	2	0
Haverstraw	7,000	9	15.43	1	11.1	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	1	1	0	0	0	0	1	3
Ramapo	5,000	14	33.60	2	14.5	0	0	0	0	0	0	0	0	0	1	0	71.45	0	4	0	0	0	1	2	0	0	5	1
Rest of district	....	153	....	23	15.3	2	0	0	2	0	3	2	3	0	6	0	120.00	13	18	4	12	7	17	15	3	8	25	10
ADIRONDACK & NORTHERN DISTRICT																												
Argyle	3,700	2	6.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	0	0	0	0	0
Greenwich	3,861	4	12.43	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	3	0	0	0	0	0	0	0	0	0	0
Fort Ann	4,267	5	14.06	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	1	0	1	1
Fort Edward	4,880	7	17.21	3	42.9	0	0	0	0	0	0	0	0	0	1	0	142.85	1	1	0	0	1	0	1	1	0	0	1
Queensbury	10,000	12	14.40	2	16.7	0	0	0	3	0	0	0	0	0	0	1	166.67	3	2	0	0	0	1	1	0	0	1	1
Ticonderoga	3,304	6	21.88	1	16.7	0	0	0	0	0	0	0	0	0	5	0	833.33	0	0	0	1	0	0	0	0	0	0	0
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	0
Port Henry	2,525	3	14.26	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0		0	0	0	0	1
Malone	7,908	20	30.27	5	25.0	0	0	0	0	0	0	0	0	0	9	1	500.00	1	0	0	3	0		0	0	1	2	2
OGDENSBURG	11,000	5	5.46	2	40.0	1	0	0	0	0	0	0	0	0	0	1	200.00	2	0	0	0	0	1	0	0	0	0	0
Gouverneur	*5,500	7	15.27	2	28.6	0	0	0	0	0	0	0	0	0	1	0	142.86	0	1	2	1	0	0	1	0	0	1	0
Ellisburgh	4,812	11	27.00	1	9.1	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	2	1	2	1	0	0	3	0
Plattsburgh	7,000	4	6.89	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	2	0	1	1	0	0	0
Cape Vincent	3,143	2	7.64	....	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	0	1	0	0	0	0	0
Rest of district	....	127	....	21	16.7	0	0		0	0	2	0	6	1	5	0	94.50	15	24		8	6	14	14	2	4	12	11
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	25	20.00	6	24.0	0	0		0	0	1	0	1	0	1	0	100.00	5	6	1	0	1	3	0	0	1	3	1
Schoharie	3,350	6	21.50	1	16.7	0	0		0	0	4	0	0	0	0	0	826.67	0	0	0	0	0	0	0	0	0	1	....
Cobleskill	3,371	1	3.56	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
Middleburgh	3,376	4	14.22	1	25.0	0	0	1	0	0	0	0	0	0	0	0	....	0	0	0	1	0	2	0	0	0	0	0
AMSTERDAM	14,000	21	18.00	5	23.8	1	0	0	0	0	0	0	2	1	2	0	238.10	4	3	2	0	1	2	0	0	2	....	0
Johnstown	*6,000	8	19.00	0	....	0	0	1	0	0	0	0	0	0	0	0	125.00	0	1	0	1	0	4	0	0	0	0	1
Gloversville	*8,000	10	15.00	2	20.0	0	0	0	0	0	0	0	0	0	3	0	300.60	0	2	0	1	0	2	0	1	0	1	0
Little Falls	7,300	5	8.22	2	40.0	0	0	0	0	0	0	0	0	0	1	0	200.00	0	2	0	0	0	0		0	0	0	1
Ilion	4,200	6	17.14	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1*	2	0		0	0	0	0
Herkimer	3,000	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0		0	0	0	0
UTICA	*39,000	54	16.41	16	29.6	0	0	0	1	0	0	0	0	0	4	0	92.60	2	13	0	0	1	10	13	2	1	5	2
ROME	12,045	10	10.00	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	4	9	1	2	0
Camden	3,400	6	21.18	0	......	1	0	0	0	0	0	0	0	0	0	0	166.67	2	0	0	0	0			0	0	1	0
Waterford	4,326	8	22.14	1	12.5	0	0	0	0	0	2	0	0	0	0	0	250.00	2	0	0	0	0			0	0	1	0
Ballston Spa	3,300	5	18.18	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	1			0	0	0	0
Saratoga Springs	10,000	15	18.00	5	33.3	0	0	0	0	0	0	0	0	0	0	0	....	5	2	0	2	0			1	0	0	1
Rest of district	....	67	....	23	34.3	0	0	2	0	0	0	0	1	0	3	0	90.00	7	8	0	2	5			2	4	6	15

† For four weeks ending January 30.

‡ Typhus fever in the Albany County Penitentiary.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	21	12.60	3	14.3	0	0	1	0	0	0	0	0	0	0	0	47.62	2	3	.	0	1	2	4	1	1	0	6
Candor	4,323	4	11.10	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250 00	0	0	0	0	0	0	0	0	1	2	0
ELMIRA	25,000	29	13.52	11	37.9	0	0	2	0	0	0	0	0	0	0	0	68.95	10	0	0	1	0	3	5	2	5	1	0
Horseheads	3,500	2	6.86	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	1	0	0
Hornellsville	10,000	7	8.40	0	......	0	0	0	0	0	0	0	0	0	0	1	142.85	1	3	1	0	0	0	1	1	0	0	0
Bath	7,400	5	8.10	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	2	1	0	0	0
Olean	8,000	9	13.50	5	55.5	2	0	0	0	0	0	0	1	0	1	1	555.55	1	1	0	0	1	0	0	0	0	1	0
Jamestown	*12,000	22	22.00	5	22.6	1	0	0	0	0	0	0	0	0	0	0	....	5	2	2	3	1	1	3	1	1	1	1
Fredonia	2,800	4	17.14	2	50.0	0	0	0	0	0	0	0	0	0	3	0	750.00	0	0	0	0	0	0	0	0	1	0	0
Rest of District	....	52	....	8	14 0	0	0	2	0	0	0	0	0	2	0	0	70 20	6	[illegible]	3	[illegible]	4	4	11	0	3	7	2
EAST CENTRAL DIST:																												
Walton	3,541	4	13.75	3	75.0	0	0	0	0	0	1	0	0	0	0	1	500.00	0	0	0	0	0	1	0	0	0	0	1
Delhi	3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	2	0	0	0	1	0
Oneonta	*5,000	6	14.40	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	2	0	0	0	0	2
Brookfield	3,685	2	6.51	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	0	0	0	0	0
Canastota	2,500	1	4.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....		1	0	0	0	0	0	0	0	0	0
Baldwinsville	3,000	4	16.00	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	2	0	0	0	0	1	0
SYRACUSE	*65,000	91	15.80	23	25.3	0	0	2	0	0	0	0	1	0	3	3	98.90	18	12	1	6	2	10	8	2	4	7	12
Geddes	7,000	4	6.86	1	25 0	0	0	0	1	0	0	0	0	0	0	0	250.00	3	0	0	0	0	0	0	0	0	0	0
Homer	3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	2	0	0	1	1
Rest of District	....	89	....	11	11.2	0	0	2	0	0	1	0	1	0	5	0	90.00	10	13	1	6	7	5	7	1	1	26	7
WEST CENTRAL DIST.																												
AUBURN	*26,000	38	17.54	8	21.0	0	0	0	0	0	0	0	0	0	0	1	26.32	15	2	0	2	2	4	9	0	0	2	1
Groton	3,450	3	10 00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	0	1
Hector	5,000	3	7.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	0	0	0	0
Seneca Falls	6,855	17	25.75	3	17.7	0	0	1	0	0	0	0	0	0	0	0	....	4	5	0	1	0	0	2	0	1	0	3
Phelps	*7,000	5	8.57	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	[illegible]	0	0	0	1	0	0	4	0
Geneva	*6 000	9	15.00	1	11 1	0	0	0	0	0	0	0	0	0	0	1	111.11	0	1	0	1	1	1	1	0	2	0	[illegible]
Lima	*2,800	2	8 57	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	0	0	0	0	0
Warsaw	3,227	8	29.77	1	12.5	0	0	1	0	0	0	0	0	0	0	0	125.00	3	0	0	1	0	1	0	0	2	0	0
Rest of District	....	[illegible]	....	8	8.7	0	0	1	0	0	1	0	1	0	3	0	65.22	6	6	[illegible]	3	7	9	15	2	5	7	10

LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	29	14.50	5	17.2	0	0	0	0	0	0	0	0	0	0	1	31.50	2	14	0	1	2	1	4	0	1	2	[illegible]
Richland	4,000	2	6.00	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	0	1	0	0	0	0	0	[illegible]
Fulton	*4,000	2	6.00	0	......	0	0	0	1	0	0	0	0	0	0	0	500.00	1	0	0	0	0	0	0	0	0	0	0
Lyons	*6,000	2	4.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	0	0	0	0
Newark	3,500	3	10.29	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	1	0	0	0	0
Palmyra	*1,800	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	2	0	1	2	0	0	1	0
Wolcott	3,753	4	12.78	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	2	0
ROCHESTER	*101,000	169	20.08	47	27.8	0	0	1	0	0	5	0	3	0	16	1	153.81	25	30	1	7	4	16	26	4	5	9	16
Brockport	4,500	4	10.67	1	25.0	0	0	0	0	0	1	0	0	0	0	0	250.00	0	0	0	0	0	1	1	0	0	0	1
Brighton	3,736	13	10.00	2	66.7	0	0	0	0	0	0	0	0	0	1	0	333.33	0	0	0	0	0	0	2	0	0	0	0
Albion	*5,000	3	7.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	0	0	0	1	0
LOCKPORT	16,000	18	13.50	0	......	0	0	0	0	0	0	0	1	0	1	0	111.11	7	0	0	0	0	3	0	0	0	2	4
Niagara	7,500	6	9.60	1	16.7	0	0	0	0	0	0	0	0	0	1	0	166.67	1	1	0	0	0	1	2	0	0	0	0
Tonawanda	4,900	11	26.93	5	45.4	0	0	0	0	0	0	0	0	0	3	0	272.72	1	2	0	0	0	0	1	1	1	0	2
Amherst	4,518	9	23.90	3	33.3	0	0	0	1	0	0	0	0	0	1	0	222.22	2	0	0	0	0	1	1	0	0	0	3
Hamburg	3,235	1	3.71	1	100.0	0	0	0	0	0	1	0	0	0	0	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Aurora	3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	2	0	0
Rest of District	....	86	......	13	15.1	1	0	0	0	0	0	0	1	0	3	9	58.14	12	12	2	5	7	6	11	5	8	9	4
Totals for the State	....	6,747	......	2,252	......	28	24	66	53	3	138	20	34	292	546	73	....	1,184	1,008	96	332	327	464	717	142	232	485	673

§ Besides nine deaths in the Soldiers' Home.

‖ Besides five deaths in County Hospital.

REMARKS — The total reported mortality for the month is 6,747; of which 33.3 were under the age of five years. There were 1,087 deaths from Zymotic diseases, a ratio per 1,000 total mortality of 161.11. There were twenty-two deaths from Typhus fever during the month from the Albany Penitentiary, the outbreak of which has been controlled. From Small Pox there were no deaths reported outside of New York city. The ratio per 1,000 of deaths from Typhoid fever is 9.80; from Diarrhœal diseases, 10.80; from Croup and Diphtheria, 81.00. From Consumption the ratio per 1,000 of deaths to the total mortality is 149.40; and from Acute Respiratory diseases, 175.50. There were 250 delayed returns received after the issue of the last Bulletin.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during February, 1886.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	2,767	23.76	1,068	37.5	14	3		34	6	43	2	13	60	236	33	166.96	592	412	44	112	181	192	255	73	106	212	186
BROOKLYN...........	*665,600	1,173	21.15	429	26.5	0	0	8	15	0	54	1	9	20	85	15	176.47	244	179	18	60	59	60	127	22	22	80	145
Gravesend...	5,000	9	21.60	5	65.5	0	0	0	2	0	0	0	0	0	4	1	666.66	0	0	0	0	1	0	1	0	0	0	0
New Lots............	20,000	31	18.60	10	32.3	0	0	0	2	0	0	0	0	0	1	0	96.77	4		0	3	0	5	6	1	1	2	1
New Utrecht	4,742	4	10.11	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1		0	1	0	1	1	0	0	0	0
LONG ISLAND CITY.	*21,000	29	16.60	10	34.5	0	0	0	1	0	2	0	0	0	1	0	310.35	5		0	2	3	5	1	0	0	2	3
Newtown	*10,000	14	16.80	6	42.9	0	0	0	0	0	0	0	1	0	1	0	142.86	1	3	0	0	0	0	0	0	0	0	8
Oyster Bay...........	*12,000	15	15.00	4	26.7	1	0	0	0	0	0	0	0	0	0	0	266.67	3	2	0	2	1	1	1	1	0	2	1
Hempstead...........	18,160	15	12.00	4	26.7	0	0	0	0	0	0	0	0	0	1	0	66.67	2	3	1	2	1	0	0	1	0	4	0
North Hempstead....	8,000	9	13.50	3	33.3	0	0	0	0	0	0	0	0	0	2	0	222.22	2	2	0	0	1	0	0	0	1	1	0
Babylon..............	4,739	7	17.72	0	......	0	0	0	0	0	0	0	1	0	0	0	....	0	3	0	0	0	1	1	0	0	1	0
Southold.......	7,267	9	14.86	1	11.1	0	0	0	0	0	1	0	0	0	0	0	111.11	0	3	0	0	0	0	2	1	1	1	0
Sag Harbor...........	8,000	14	56.00	5	35.7	0	0	0	0	0	0	0	0	0	0	0	....	5	2	0	1	0	2	3	0	1	0	0
Edgewater............	10,000	12	14.40	3	25.0	0	0	0	0	0	0	0	1	0	0	0	83.33	0	2	0	2	2	1	3	0	1	0	0
Northfield.............	7,014	16	27.37	7	......	0	0	0	0	0	0	0	0	2	0	0	125.00	4	1	0	0	1	1	5	0	0	1	1
Westfield	5,289	6	13.61	4	66.6	0	0	1	0	0	0	0	0	0	1	0	333.33	1	1	0	1	0	1	0	0	0	0	0
YONKERS..............	*23,000	34	17.74	10	29.4	0	0	0	0	0	0	0	0	1	0	0	29.41	8	6	0	2	2	2	5	1	1	1	5
Westchester	*6,900	12	20.86	2	43.8	0	0	0	0	0	0	0	0	0	0	0	....	3	2	0	4	1	1	0	0	0	0	1
Mount Vernon.........	*5,000	†9	21.60	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	3	0	4	0	0	0	2
Rye.....................	*7,500	2	3.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	0	0	0	0
Sing Sing....	*6,500	9	16.61	2	22.2	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	1	0	0	1	1	1	1	2
New Rochelle....	5,276	7	15.92	3	42.8	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	0	2	0	0	0	2
Rest of district.......	....	60	....	21	35.0	1	0	0	0	0	1	0	2	1	1	1	115.00	10	7	1	4	2	1	9	0	3	8	8
HUDSON VALLEY DIST:																												
ALBANY	96,000	162	20.25	40	24.7	1	4	3	1	1	0	0	2	1	14	0	166.67	34	22	1	4	10	17	17	6	5	8	11
West Troy............	13,000	19	17.52	8	42.1	0	0	1	0	0	0	0	0	0	2	1	210.52	5	3	0	1	0	1	4	0	0	1	0
Hoosick Falls.........	*4,000	5	15.00	2	40.0	1	0	0	0	0	0	0	0	0	0	0	100.00	1	1	0	0	0	1	1	0	0	0	0
Troy....................	*60,000	122	24.40	30	24.6	5	0	5	0	0	0	0	0	0	8	1	155.55	9	25	2	6	9	11	11	4	5	6	12
Lansingburgh.........	*9,700	11	13.60	4	36.4	0	0	0	0	0	0	0	0	0	2	0	172.72	1	3	1	0	0	0	1	0	0	2	1
Green Island.........	*5,000	10	24.00	3	30.0	0	0	0	0	0	0	0	0	0	6	0	....	3	2	0	0	0	0	1	0	1	0	3
Greenbush............	7,200	12	20.00	6	50.0	0	0	0	0	0	0	0	0	0	1	0	83.33	1	0	0	3	0	1	2	1	1	1	1
Coxsackie	4,600	3	9.00	0	......	0	0	1	0	0	0	0	0	0	0	0	333.33	0	1	0	0	0	1	0	0	0	0	0

HUDSON	*10,000	27	32.40	12	44.4	0	0	0	0	0	0	0	0	1	4	3	296.30		4	1	3	0	1	5	0	0	1	2
KINGSTON	21,000	22	12.57	6	27.3	0	0	0	1	0	1	0	0	0	1	0	136.36		4	0	2	1	3	1	0	2	0	1
Wawarsing	8,547	4	5 61	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	0	0	1	0	0
Rosendale	5,000	1	2.40	0	......	0	0	0	1	0	0	0	0	0	0	0	100.00	0	0	0	0	0	0	0	0	0	0	0
Marbletown	4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0		0		0	1
Esopus	4,736	6	15.20	2	33.3	0	0	0	0	0	0	0	0	1	1	0	333.33	0	1	0	0	1	0		0		0	0
Saugerties	*4,000	8	24.00	1	12.5	0	0	0	0	0	0	0	0	0	4	0	500.00	1	0	0	0	1	1	1	0		0	0
POUGHKEEPSIE	20,200	31	18.41	7	22.6	0	0	1	0	0	0	0	1	0	0	1	96.77	5	2	0	2	1	3	4	2		5	4
Fishkill	10,732	7	8.50	2	28.6	0	0	0	0	0	0	1	0	0	0	0	165.00	0	1	0	1	0	1		0		1	1
Wappinger Falls	5,000	5	12.00	2	40.0	0	0		1	0	0	0	0	0	0	0	200.00	2	1	1	0	0	0		0	0	0	0
NEWBURGH	20,000	24	14.49	7	29.2	0	0	0	0	0	0	0	1	0	0	0	41.67	2	4	1	2	2	3		0	2	1	2
Port Jervis	9,000	10	13.33	3	30.0	0	0	0	0	0	0	0	1	0	0	0	100.00	0	0	0	0	1	2		1	1	2	1
Middletown	10,000	15	18.00	4	26.7	0	0	0	0	0	0	0	0	0	0	0	....	4	2	0	2	0	0		1	2	0	2
Goshen	4,387	‡17	46.50	5	29.5	0	0	3	0	0	0	0	0	0	0	0	176.50	2	2	0	0	0	1		0	0	1	3
Haverstraw	7,000	8	14.14	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	1	0	0	0	1	1	1
Orangetown	8,077	3	4.45	0	......	1	0	0	0	0	0	0	0	0	0	0	333.33	0	2	0	0	0	0	0	0	9	0	0
Rest of district	....	184	....	81	17.0	0	0	1	0	0	1	0	1	2	11	0	103.27	30	26	2	9		20	21	4	9	24	6
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	3	9.73	0	......	0	0	0	0	0	0	0		0	0	1	....	0	0	0	0	0	0	1	0	0	0	1
Greenwich	3,861	6	18.67	1	16.7	1	0	0	0	0	0	0	0	0	0	0	166.67	1	2	0	0	0	0	0	0	0	1	1
Fort Ann	4,267	5	14.06	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	1	0	2	0	0	0	0	1	0
Fort Edward	4,880	5	12.30	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	1	1	0	0	0
Queensbury	10,000	15	18.00	2	13.3	0	0	0	0	0	0	0	0	0	0	0	....	1	4	1	0	0	3	3	0	1	2	0
Ticonderoga	3,200	1	10.91	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	1
Crown Point	4,287	3	8.37	0	......	0	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	1	1	0	0	0	0
Port Henry	2,525	1	5.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Malone	7,908	10	15.20	3	30.0	0	0	0	0	0	1	1	0	0	1	0	300.00	0	0	0	3	1	1	1	0	0	0	1
OGDENSBURG	11,000	11	12.00	0	......	0	0	0	0	0	0	0		0	1	1	181.81	2	0	0	0		1	0	0	0	4	1
Gouverneur	*5,500	8	17.45	0	......	0	0	1	0	0	0	0	0	0	1	0	285.71	0	0	0	1		1	1	2	0	0	0
Ellisburgh	4,812	11	27.50	3	25.5		0	0	0	0	0	0	0	0	0	0	90.90	0	0	0	1		0	2	0	0	4	2
Plattsburgh	7,000	4	6.85	0	......		0	0	0	0	0	0	0	1	0	0	250.00	0	1	0	0		0	0	1	0	1	0
WATERTOWN	12,269	21	20.53	4	19.0		0	0	0	0		0	0	0	3	1	238.10	0	4	1	1		0	1	4	1	2	2
Cape Vincent	3,143	3	11.45	0	......		0		0	0		0	0	0	0	0	....	0	1	0	0		2	0	0	0	0	0
Rest of district	....	108	....	23	21.5		0		0	0		0		2	12	1	158.88	15	15	3	7		5	8	1	1	20	13
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	20	16.00	6	30.0	1	0	2	0	0	2	0	0	0	2	1	400.00	2	4	0	0		2		0	1	1	0
Schoharie	3,350	5	18.00	1	33.3	0	0	0	0	0	0	0	0	0	1	0	200.00	1	1	0	0		0		0	0	0	1
Middleburgh	3,376	7	24.88	1	14.3	0	0	0	0	0	2	0	0	0	0	0	285.71	0	0	0	0	1	1	1	0	0	2	0
AMSTERDAM	14,000	1	11.15	5	38.5	0	0	0	0	0	0	0	0	0	2	0	113.80	2	3	0	0	0	1	3	0	0	2	0
Johnstown	*6,000	5	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	2	0	0	0	0	2	1
Gloversville	*8,000	5	7.50	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1	0	2	0	1
Little Falls	7,300	5	8.22	0	......	0	0	0	1	0	0	0	0	0	0	0	200.00	1	0	0	0	0	0	2	1	0	0	0
Ilion	4,200	5	14.28	1	20.0	0	0	0	0	0	0	0	1	0	0	0	....	0	1	0	0	0	1	1	0	0	1	0
Herkimer	3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	1	0	0	0	0	0
UTICA	*39,000	51	15.69	16	31.3	7	0	0	0	0	0	0	0	0	1	0	156.85	10	12	0	4	1	0	1	0	3	2	10
ROME	12,045	16	16.00	2	12.6	1	0	1	0	0	0	0	0	0	1	0	187.50	3	1	0	1	0	0	4	0	0	2	2
Boonville	4,000	1	3.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Camden	3,400	2	7.05	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	0	0
Waterford	4,326	10	27.73	7	70.0	0	0	0	0	0	0	0	0	0	0	0	....	4	1	0	2	1	1	0	0	1	0	0
Ballston Spa	3,300	3	10.85	1	33.3	0	0	0	0	0	0	0		0	0	0	....	0	1	0	0	0	1		0		0	0
Saratoga Springs	10,000	4	4.80	3	75.0	0	0	0	0	0	0	0		0	0	0	....	2	0	0	1	0	0		0		0	0
Rest of district	....	68	....	15	22.0	1	0	0	1	0		0		0	1	0	58.82	8	7	0	7	1	7		0		14	7

† Besides seven at Infant Asylum.

‡ Besides five in Orange County Alms-house.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during January, 1886.

[Cities are printed in SMALL CAPITALS, villages in *italics* and towns in Roman type. The populations preceded by a star (*) are estimated to date; the remainder are from the census of 1880.]

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,397,395	2,979	25.58	1,180	39.5	14	2	12	26	3	49	5	12	70	252	38	360.00	590	490	41	†124	†172	†167	263	54	106	237	252
BROOKLYN	*665,600	1,268	22.86	502	39.5	0	0	10	15	0	46	1	5	19	125	15	186.12	258	145	20	61	51	68	148	20	30	20	305
Gravesend	5,000	6	14.40	2	33.3	0	0	0	0	0	1	0	0	0	0	0	166.67	2	1	0	0	0	0	0	0	1	0	1
New Lots	20,000	25	15.00	7	28.0	0	0	0	2	0	0	0	0	0	2	0	160.00	4	4	0	1	0	4	2	0	2	0	4
New Utrecht	4,742	4	10.12	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	0	1	0	0	0	0	2
LONG ISLAND CITY	*21,000	35	20.00	13	37.1	0	0	1	0	0	0	0	0	1	2	2	171.43	9	7	0	1	3	1	1	1	0	4	3
Newtown	*10,000	21	25.20	10	47.6	0	0	1	0	0	1	0	0	0	2	0	190.47	5	5	0	0	0	1	1	1	1	0	3
Oyster Bay	*12,000	19	19.00	4	21.0	0	0	0	0	0	0	0	0	1	0	0	52.63	3	2	0	2	2	2	3	2	0	1	1
North Hempstead	8,000	8	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	0	1	2	0	0	0	0	0
Babylon	4,739	2	5.07	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	0
Southold	7,267	16	26.48	2	12.5	0	0	0	1	0	3	0	0	6	1	0	333.33	0	2	0	0	0	0	3	0	2	3	1
Sag Harbor	3,000	6	24.00	2	33.3	0	0	0	0	0	1	0	0	0	0	0	166.67	0	1	0	1	0	0	1	0	0	0	2
Northfield	7,014	10	17.14	5	50 0	0	0	0	0	0	2	0	0	0	0	0	200.00	2	0	0	2	1	0	0	0	0	0	2
Westfield	5,289	14	31.60	4	28.5	0	0	0	0	0	0	0	0	0	1	0	71.42	1	7	0	0	0	2	1	0	1	0	1
YONKERS	*22,000	40	21.85	15	37.5	0	0	1	0	0	0	0	0	1	2	0	100.00	7	6	1	1	2	2	4	1	2	2	8
Westchester	*6,900	11	19.13	2	18.2	0	0	0	0	0	2	0	0	0	1	0	272.73	1	1	0	0	0	3	0	0	0	2	1
Mount Vernon	*5,000	6	14.40	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	1	0	1	0	0	1	1
Rye	3,500	5	17 14	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	3	0	0	0	0
Sing Sing	*6,500	13	24.00	5	38.4	0	0	0	0	0	0	0	0	0	4	0	307.70	0	2	0	0	0	2	2	1	0	1	1
New Rochelle	5,276	7	15.73	2	28.6	0	0	0	0	0	0	0	0	0	3	0	428.57	0	0	0	0	0	0	2	0	1	0	1
Rest of District	....	85	....	32	37.6	0	0	0	1	0	3	0	0	3	2	0	105.88	11	18	0	7	4	2	16	3	4	4	7
HUDSON VALLEY DIST:																												
ALBANY	96,000	215	26.87	47	21.9	4	21‡	4	0	0	0	[illegible]	1	0	25	2	306 98	23	27	1	18	7	24	11	9	4	10	15
COHOES	*20,000	46	27.60	18	39.1	0	0	2	0	0	6	2	0	1	7	0	391.30	4	7	0	4	0	1	7	1	0	1	3
West Troy	13,000	30	27.70	8	26.7	0	0	3	0	0	0	0	0	0	5	0	300.00	7	2	0	1	1	1	3	2	1	1	3
Hoosick Falls	4,000	5	15.00	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	3	0	0	0	1
TROY	*60,000	97	19.20	21	21.9	0	0	3	0	0	0	1	1	2	6	1	185.45	15	18	4	6	5	12	8	2	5	4	4
Lansingburgh	*9,700	11	13.87	3	30.0	0	0	1	0	0	0	0	0	0	0	0	100.00	1	1	0	1	0	6	0	0	0	2	[illegible]
Green Island	*5,000	6	14.40	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	1	0	0	0	[illegible]	[illegible]

Lima	*2,800	4	17.14	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	3	0	0	0	0	0	0	0	0	1
Warsaw	3,227	2	7.43	0	......	0	0	0	0	0	0	0	0	0	1	0	300.00	0	0	0	0	1	0	0	0	2	0	0
Rest of district	....	82	....	12	15.0	0	0	2	1	0	1	0	0	0	2	1	87.30	16	12	0	5	2	3	7	6	2	12	10
LAKE ONTARIO AND WESTERN DISTRICT																												
OSWEGO	*24,000	30	15.00	3	10.0	0	0	1	1	0	0	0	0	0	0	0	66.66	2	7	1	2	1	6	2	0	1	4	2
Richland	4,000	4	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	0	1	0	1	0
Fulton	*4,000	3	9.00	1	33.3	0	0	1	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	1	0	0	0	0
Lyons	*6,000	10	20.00	1	10.0	2	0	0	0	0	1	0	0	0	0	1	400.00	1	1	0	0	1	2	0	0	0	1	0
Newark	3,500	5	17.14	1	20.0	1	0	0	0	0	1	0	0	0	0	0	400.00	0	1	0	0	0	1	1	0	0	0	0
Palmyra	*4,800	6	15.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	1	1	0	0	2	0
Wolcott	3,753	3	9.52	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	1	1
Clyde	3,000	3	12 00	2	66 6	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	1	0	0
ROCHESTER	*101,000	132	15 68	35	26.5	0	0	1	1	0	2	0	2	1	9	0	121.21	21	24	2	9	8	9	21	0	7	5	10
Brockport	4,500	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	2	0	0	0	0	0	1	0
Brighton	3,736	‡4	12.85	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	1	0	0	1	0
Albion	*5,000	6	14.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	0	3	0	0	0
LOCKPORT	16,000	16	12.00	2	12.5	0	0	0	0	0	0	0	0	0	0	0	....	2	3	1	3	1	1	2	1	1	0	1
Tonawanda	4,900	5	12.25	2	......	0	0	1	0	0	0	0	0	0	2	0	600.00	1	0	0	0	0	1	0	0	0	0	0
Amherst	4,518	4	10.67	1	25.0	0	0	0	0	0	0	0	0	0	1	0	....	1	0	0	0	0	0	0	0	0	1	1
Aurora	3,000	3	12.00	2	66.6	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	1	0	0	0	1
Rest of district	....	126	....	20	16.6	2	0	2	1	0	3	1	2	0	6	†1	158.33	18	13	2	12	6	9	10	2	5	17	13
Totals for the State	....	6,288	....	2,011	......	42	7	57	66	7	119	7	44	106	497	70	....	1,110	946	88	324	347	481	687	157	222	461	555

† Besides four in Soldiers' Home.

‡ Besides eight in Public Institutions.

REMARKS.—The total reported mortality for the month is 6,288; of which 32 per cent were under the age of five years. There were 962 deaths from Zymotic diseases, a ratio per 1,000 total mortality of 153. The ratio per 1,000 of deaths from Typhoid fever is 9.06; from Diarrhœal diseases, 11.12; from Croup and Diphtheria, 69.50. The prevalence of Diphtheria has been chiefly in localities along the Hudson Valley. From Cerebro-Spinal Meningitis, seven deaths are reported during the month in Utica; the ratio for the whole State from this disease is 6.67 per 1,000 deaths. From Consumption the ratio of mortality is 150.03 per 1,000 deaths, and from Acute Respiratory diseases, 160.60. From the Zymotic diseases, Consumption and Puerperal diseases combined, 317.11 deaths occurred to each 1,000 of total mortality. In Buffalo, 238 deaths are reported to have occurred during four weeks ending January 30. There were 200 delayed returns received after the issue of the last Bulletin.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during March, 1886.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,439,037	3,392	28.28	1,224	36.0	25	5	28	37	6	42	8	26	87	236	40	139.20	696	521	46	146	215	164	293	78	116	278	298
BROOKLYN	*665,600	1,389	25.00	523	37.5	0	0	3	23	0	45	3	6	22	116	8	162.10	336	198	14	56	81	67	145	25	19	33	190
Gravesend	5,000	2	5.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	0	1	0	1	0	0
New Lots	20,000	29	17.40	10	34.5	0	0	0	1	0	0	0	0	1	2	0	137.93	7	8	0	2	0	1	4	0	1	0	2
New Utrecht	4,742	3	8.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	1	0	0	1	0	0	1	0
LONG ISLAND CITY	*21,000	41	23.43	18	43.9	0	0	0	0	0	1	0	0	1	3	0	120.00	16	7	0	1	1	1	4	1	0	4	1
Newtown	*10,000	25	30.00	8	32.0	1	0	0	0	0	0	0	0	1	1	0	120.00	10	1	0	1	1	0	4	0	0	3	3
Oyster Bay	*12,000	15	15.00	2	13.3	0	0	1	0	0	1	0	0	0	0	0	133.33	2	3	0	3	0	0	1	1	0	2	1
Hempstead	18,160	18	12.00	6	33.3	0	0	0	0	0	0	0	0	0	0	0	......	5	1	3	0	3	0	0	0	0	2	5
North Hempstead	8,000	4	6.00	1	25.0	0	0	0	1	0	0	0	0	0	0	0	250.00	0	0	0	0	1	0	1	0	1	0	0
Jamaica	10,089	14	16.78	5	35.7	0	0	0	1	0	0	0	0	0	1	0	142.85	2	2	0	1	0	3	0	2	0	1	1
Babylon	4,739	6	15.20	0	......	0	0	0	0	0	0	0	0	0	0	0	......	2	1	0	2	0	1	0	0	0	0	0
Southold	7,267	7	11.56	2	28.5	0	0	0	0	0	2	0	0	0	0	0	285.71	0	1	1	0	0	0	1	1	0	1	0
Sag Harbor	3,000	6	24.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	0	2	0	1	2	0
Edgewater	10,000	25	30.00	6	24.0	0	0	1	0	0	0	0	0	1	1	0	120.00	5	2	0	4	4	2	0	1	1	1	2
Northfield	7,014	19	32.57	6	31.5	0	0	0	0	0	1	0	0	0	3	0	210.52	6	2	0	0	1	1	2	0	1	2	0
Westfield	5,289	6	13.61	3	50.0	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	1	1	1	1	0	0	1	0
YONKERS	*22,000	56	30.55	16	28.6	1	0	0	0	0	0	0	0	0	2	0	53.57	12	8	0	2	3	5	11	1	6	3	2
Westchester	*6,900	14	24.35	7	50.0	1	0	0	0	0	3	0	0	0	1	1	500.00	0	0	0	0	0	0	0	0	2	2	3
Mount Vernon	*5,000	18	19.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	......	3	1	0	0	0	0	0	0	0	3	1
Sing Sing	*6,500	17	31.25	7	41.3	0	0	0	0	0	0	2	0	0	2	0	235.30	2	2	0	0	2	0	5	0	0	0	2
New Rochelle	5,279	10	22.72	1	10.0	0	0	0	0	0	0	0	0	0	0	0	......	1	3	0	0	0	1	2	0	2	1	0
Rest of District	....	62	....	20	32.2	0	0	0	0	0	0	0	0	0	1	2	48.50	19	9	1	4	5	4	4	0	1	5	7
HUDSON VALLEY DIST:																												
ALBANY	96,000	197	24.58	70	35.5	*	0	6	0	0	0	0	0	2	12	12	180.00	43	28	2	13	10	24	7	3	2	11	18
COHOES	*20,000	8	4.80	2	25.0	0	0	0	1	0	0	0	0	0	0	0	125.00	1	3	0	0	0	1	0	0	0	0	2
West Troy	13,000	28	25.85	6	21.4	0	0	3	0	0	0	0	0	0	5	0	285.71	5	6	0	2	1	0	3	0	0	1	2
Hoosick Falls	4,000	9	27.00	3	33.3	0	0	0	0	0	0	0	0	0	0	0	......	3	2	0	1	0	0	2	0	0	0	1
TROY	*60,000	148	29.60	40	27.0	5	0	1	0	0	1	3	0	1	8	0	128.00	42	25	2	7	3	15	11	5	4	6	9
Lansingburgh	*9,700	20	24.74	7	35.0	0	*0	2	0	0	0	0	0	0	1	0	160.00	2	2	1	0	2	4	2	0	0	4	0
Green Island	*5,000	8	19.20	1	12.5	0	0	0	0	0	1	0	0	0	0	0	125.00	1	2	0	0	0	2	0	0	0	0	3
Greenbush	7,200	11	18.34	4	36.4	0	0	0	0	0	0	0	0	0	0	0	......	1	1	0	1	1	2	2	1	2	0	0

Coxsackie	4,000	3	9.00	1	33.3	1	0	0	0	0	0	0			0		333.33			1		0			0	0	0	0
Catskill	*4,500	10	26.67	8	30.0	0	0	0	1	0	0	0	0	0	0	0	100.00	5		0		0	0		0	0	0	1
HUDSON	*10,000	17	20.40	4	23.5	0	0	0	0	0	0	0	0	0	0	1	58.82	2		0		0	7		0	1	1	0
KINGSTON	21,100	24	13.65	4	16.6	2	0	0	0	0	0	0	0	0	1	0	125.00	5		1		1	0		0	1	2	0
Wawarsing	8,547	9	12.63	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	3		0		0	2		0	0	0	8
Rosendale	5,000	3	7.20	1	33.3	1	0	0	1	0	0	0	0	0	0	0	666.60	1		0		0	0		0	0	0	0
Marbletown	4,000	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0		0		0			0	0	2	0
Esopus	4,736	7	17.74	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	2		0		0			1	0	2	1
Saugerties	*4,000	7	21.00	0	......	0	0	0	0	0	0	0	0	0	1	0	142.86			0	2	0	1		0	0	1	0
POUGHKEEPSIE	20,200	42	24.95	16	38.1	0	0	0	0	0	0	0	0	2	2	0	100.00			0	1	2	1		0	0	6	8
Fishkill	10,732	19	21.25	5	26.3	0	0	0	0	0	0	0	1	1	1	0	157.90			0	2	2	2		0	0	3	1
Wappinger Falls	5,000	6	14.50	1	16.7	0	0	0	0	0	0	0	0	0	0		....				2	0	0		0	0	0	3
NEWBURGH	20,000	36	21.60	11	30.5	0	0	0	0	0	0	0	0	0	0		55.55			0	4	3	5		0	2	4	1
Port Jervis	9,000	16	21.33	3	19.0	0	0	0	0	0	0	0	0	0	0		....			0	0	0	0		0	3	3	5
Middletown	10,000	15	18.00	5	33.3	0	0	0	1	0	0	0	1	0	1		266.67			0	0	0	1		0	0	2	2
Goshen	4,387	8	21.90	0	......		0	0	0	0	1	0	0	0	2		375.00			0	0	0	0		0	1	1	0
Haverstraw	7,000	16	27.43	4	25.0		0	0	0	0	0	0	0	0	0		....				3		2		0	0	0	1
Ramapo	5,000	7	16.80	2	28.5	0	0	0	0	0	0	0	0	1	0		142.85				0		1		0	1		1
Rest of district	....	214	....	44	20.5	0	0	4		0	5		0	0	13		112.15	33	32		13		12	28	5	11	31	18
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	5	16.22	0	......	0	0	0			0	0	0	0	0	0	....				0		2		1			0
Salem	3,500	4	13.72	1	25.0	0	0	0			0	0	0	0	0	0	....				0		0		1	0	1	0
Fort Ann	4,267	4	11.16	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....				0		0		0	0	0	0
Fort Edward	4,880	4	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....				0		0		0	0	2	0
Queensbury	10,000	18	21.00	4	22.2	0	0	0	0	0	0	0	0	0	3	0	166.67				2		0		1	1	1	0
Crown Point	4,287	4	11.15	0	......	0	0	0	0	0	0	0	0	0	0	0	....				1		1		0	0	0	0
Port Henry	2,525	5	23.32	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....								0	0	0	1
Malone	7,908	14	21.26	3	21.4	1	0	0	0	0	0	1	0	0	2	0	285.76			0					0	0	1	1
OGDENSBURG	11,000	12	13.10	5	41.7	0	0	0	0	0	0	0	0	0	0	1	83.33			0					1	1	2	2
Gouverneur	*5,500	6	13.10	0	......	0	0	0	0	0	0	0	0	0	2	0	333.33	0	2	1				0	0	0	0	0
Ellisburgh	4,812	5	12.50	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1				1	0	0	0	1
Plattsburgh	7,000	10	17.14	2	20.0	0	0	0	0	0	0	0	0	0	1	0	100.00	2	0	0				3	0	0	1	0
Cape Vincent	3,143	2	7.60	0	......	0	0	0	0	0	0	0		0	0	0	....	0	0	0				0	1		1	0
Rest of district	....	128	....	30	23.5	2	0	2	0	0	2	2		1	2	0	93.75	18	21	4				12	3		12	17
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	21	16.80	6	29.9	0	0	3	0	0	0		0	0	3	0	285.71		4	1		0		4	1	0	1	1
Schoharie	3,350	2	7.16	0	......	0	0	0	0	0	0	0		0	0	0	....		0	0		0		0	0	0	0	0
Cobleskill	3,371	5	17.80	1	20.0	0	0	0	0	0	0	0		0	0	0	....		0	0		0		0	1	1	0	0
Middleburgh	3,376	1	3.50	0	......	0	0	0	0	0	0	0		0	0	0	....	1	0	0		0		0	0	0	0	0
AMSTERDAM	14,000	23	19.71	5	21.7	1	0	0	0	0	0	0		0	0	0	....	6	3	0		4		2	2	0	0	3
Johnstown	*6,000	14	28.00	2	14.3	0	0	0	0	0	0	0		0	1	0	71.43	5	0	0				3	0	0	0	0
Gloversville	*8,000	13	18.25	5	38.5	1	0	0	0	0	0	0	0	0	4	0	384.61	0	1	0		0	0	2	2	0	1	1
Little Falls	7,300	3	4.09	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	1	0	0	0	0
Ilion	4,200	3	8.57	0	......	0	0	0	0		0	0	0	0	0	0	....	0	2	1	0	0	0	0	0	0	0	0
Herkimer	3,000	2	8.00	0	......	0	0	0	0		0	0	0	0	0	0	....	1	0	0	0	1	0	0	0	0	0	0
UTICA	*39,000	59	18.00	25	42.3	3	0	1	0	0	0	0	0	0	3	2	152.58	3	4	0	7	2	5	18	4	1	3	3
ROME	12,045	16	16.00	1	6.2	0	0	0	0	0	0	0	0	0	0	0	....	2	5	0	0	0	1	1	0	1	5	1
Boonville	4,000	5	15.00	1	20.0	1	0	0	0		0	0	0	0	0	0	200.00	0	0	0	0	0	0	0	0	0	2	2
Camden	3,400	3	10.60	0	......	0	0		0		0		0	0	0	0	....	1	1	0	0	0	0	0	0	0	1	0
Waterford	4,326	7	19.41	4	57.1	0	0		1		1		0	0	0	0	285.70	0	0	0	0	2	0	1	0	0	0	2
Ballston Spa	3,300	5	18.18	0	......	0	0		0		0		0	0	0	0	....	2	1	0	0	1	0	0	0	0	1	0
Saratoga Springs	10,000	13	15.60	2	15.4	0	0		0		0		0	1	1	1	230.77	2	2	0	0	1	1	3	0	0	1	0
Rest of district	....	103	....	20	20.0	0	0		0		4		0	1	2	0	100.00	13	13	1	5	2	11	15	2	0	24	7

† Besides five in New York Infant Asylum.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	36	21.60	8	22.2	0	0	0	1	0	0	0	1	0	2	0	111.11	5	4	2	0	1	1	10	0	2	1	6
Candor	4,323	5	14.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	0	0	1	1	0
Waverly	*3,000	6	24.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	3	1
ELMIRA	25,000	30	11.40	5	16.7	0	0	0	0	0	0	0	0	1	0	0	33.33	10	8	2	4	0	3	2	1	2	2	0
Horseheads	8,500	1	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Bath	7,400	10	16.22	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	0	0	3	4
Olean	8,000	5	7.50	4	80.0	0	0	0	0	0	0	0	0	0	0	0	....	3	0	0	0	0	0	1	0	0	0	1
Jamestown	*12,000	12	12.00	1	8.3	0	0	0	0	0	0	0	0	0	0	0	....	2	0	1	2	0	2	1	2	1	0	1
Fredonia	2,800	6	25.71	0	......	1	0	0	0	0	0	0	0	0	0	0	166.67	0	0	0	0	0	0	2	0	1	2	0
Rest of District	....	51	....	10	18.5	2	0	1	0	0	1	0	1	0	0	0	92.50	6	7	0	[illegible]	0	3	16	2	2	[illegible]	1
EAST CENTRAL DIST:																												
Walton	3,541	6	20.84	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	1	0	0	1	1	2
Delhi	3,000	3	12.00	0	......	0	0	0	0	0	0	0	1	0	0	0	333.33	0	0	0	0	0	0	0	0	0	2	0
Franklin	3,000	6	21.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	1	0	1	1	0	0	0	2	0
Oneonta	*5,000	8	19.20	2	25.0	0	0	1	0	0	0	0	0	0	0	1	250.00	1	1	1	0	0	0	1	0	0	1	1
Worcester	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	0	0	0	0	1	0
Cazenovia	4,363	3	8.25	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	1	0
Brookfield	3,685	5	16.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	1	1	0	0	1	0
Canastota	2,500	4	19.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	2	1
Baldwinsville	3,000	4	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	0	0	1	1
SYRACUSE	*65,000	82	13.14	22	26.2	0	0	0	1	0	0	0	0	0	1	1	36.58	14	13	1	0	2	8	16	4	3	7	11
Cortland	7,361	6	9.78	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	2	1	0	0	0
Homer	3,000	6	24.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	2	0	1	0	1
Rest of District	....	182	....	15	11.4	2	0	3	1	0	0	0	2	0	5	0	100.00	28	13	0	7	4	11	17	5	4	22	8
WEST CENTRAL DIST:																												
AUBURN	*26,000	42	19.23	10	23.8	1	0	1	0	0	0	0	1	0	1	0	95.23	9	5	3	3	3	4	5	0	2	3	1
Ithaca	10,000	14	16.80	2	14.3	0	0	2	0	0	0	0	0	0	0	0	142.86	3	1	0	3	0	1	2	0	0	2	0
Waterloo	*4,500	10	26.66	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	2	1	0	1	0	0	0	1
Hector	5,000	2	4.80	2	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	0
Seneca Falls	6,853	5	8.75	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	0	0	1	0	1
Manchester	*4,000	6	18.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	4	0
Phelps	*7,000	10	17.14	3	30.0	0	0	1	0	0	0	0	0	0	0	0	100.00	1	1	0	0	1	1	0	0	0	5	0
Canandaigua	6,300	5	9.53	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	1	0	0	0	2	0	0	0	0	0	1
Geneva	*6,000	8	16.00	2	25.0	0	0	1	0	0	0	0	0	0	0	0	125.00	1	0	0	0	0	0	2	1	0	0	3

Attica	3,100	4	15.00	2	50.0	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	1	0	0		1
Penn Yan	4,500	9	24.00	1	11.1	0	0	0	0	0	0	0	0	0	0	0	......	1	1	0	0	0	1	3		0	1	1
Rest of District	......	111	......	10	9.1	0	0	0	0	0	0	1	0	0	0	0	9.09	12	20	3	5	2	11	17		4	25	4
LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	85	17.50	7	20.0	0	0	1	0	0	1	5	3	0	2	0	200.00	4	5	0	3	0	2	4	1	2	5	2
Richland	4,000	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	2	0
Fulton	*4,000	9	27.00	3	33.3	0	0	0	0	0	0	0	0	0	0	0	......	2	2	0	2	0	0	1	0	0	1	1
Lyons	*6,000	8	16.00	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00	2	2	0	2	0	0	0	0	0	1	
Newark	3,500	1	3.48	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	0
Palmyra	*4,800	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	......	2	1	0	0	0	0	2	0	0	1	0
Wolcott	3,733	5	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	2	0	0	0	0	2	0	0	1	0
ROCHESTER	*101,000	153	18.18	17	30.8	0	0	1	0	0	1	0	2	2	7	0	86.67	18	20	2	3	10	16	24	3	4	9	21
Brockport	4,500	6	16.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	......	0	2	0	0	0	1	1	0	0	1	1
Brighton	3,736	†5	16.12	1	20.0	0	0	0	0	0	0	0	0	0	1	0	......	1	0	0	1	0	0	0	1	0	1	0
Albion	*5,000	5	12.00	2	40.0	1	0	0	0	0	0	0	0	0	0	0	200.00	1	1	0	0	1	0	0	0	0	0	1
LOCKPORT	15,000	16	12.80	1	6.2	0	0	0	0	0	0	0	0	0	0	0	......	1	2	0	2	1	2	2	2	0	2	2
BUFFALO	*202,818	‡287	18.40	126	43.8	4	0	3	3	0	3	0	0	3	20	2	132.40	54	32	2	16	4	17	47	8	8	23	38
Tonawanda	4,900	4	10.00	1	25.0	0	0	1	0	0	0	0	0	0	1	0	500.00	0	0	0	0	1	0	1	0	0	0	0
Amherst	4,518	4	10.67	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	0	2	0	1	0	0	0
Aurora	3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	4	0	0	0	1	0
Rest of District	......	133	......	23	17.7	2	0	0	2	0	3	0	0	9	8	0	115.40	17	21	4	8	6	8	20	5	1	24	4
Totals for the State	......	7,918	......	2,552	32.2	63	5	75	78	6	119	[illegible]	46	129	490	76	......	1,590	1,129	106	395	418	474	853	193	234	660	758

† Besides ten in Public Institutions.

‡ For four weeks ending March 27.

REMARKS — The total reported mortality for the month is 7,918; of which 32.2 per cent were under the age of five years. From Zymotic diseases there were 1,108 deaths, a ratio per 1,000 total mortality of 138.67. The ratio per 1,000 of deaths from Typhoid fever is 9.47; from Diarrhœal diseases, 9.60; from Croup and Diphtheria, 61.88. From Typhus fever and Small Pox deaths are reported only from New York city. From Consumption the ratio of mortality is 142.59 per 1,000 deaths from all causes; and 210.00 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases, is 295.91. From Acute Respiratory diseases there were 200.81 deaths per 1,000, which is a little lower than that of February and March, 1885. The increased mortality over that of recent months is partly due to the addition to that of Buffalo, and partly to the receipt of returns from new boards of health.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	36	21.60	8	22.2	0	0	0	1	0	0	0	1	0	2	0	111.11	5	4	2	0	1	1	10	0	2	1	3
Candor	4,323	5	11.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	0	0	1	1	0
Waverly	*3,000	6	24.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	8	1
ELMIRA	25,000	30	11.40	5	16.7	0	0	0	0	0	0	0	0	1	0	0	333.33	10	3	2	4	0	8	2	1	2	2	9
Horseheads	3,500	1	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	9
Bath	7,400	10	16.22	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	0	0	8	4
Olean	8,000	5	7.50	4	80.0	0	0	0	0	0	0	0	0	0	0	0	....	8	0	0	0	0	0	1	0	0	0	1
Jamestown	*12,000	12	12.00	1	8.3	0	0	0	0	0	0	0	0	0	0	0	....	2	3	1	2	0	2	1	2	1	0	1
Fredonia	2,800	6	25.71	0	......	1	0	0	0	0	0	0	0	0	0	0	166.67	0	0	0	0	0	0	2	0	1	2	0
Rest of District	....	51	....	10	18.5	2	0	1	0	0	1	0	1	0	0	0	92.50	6	7	0	6	0	3	16	2	3	8	1
EAST CENTRAL DIST:																												
Walton	3,541	6	20.31	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	1	0	0	1	1	2
Delhi	3,000	3	12.00	0	......	0	0	0	0	0	0	0	1	0	0	0	333.33	0	0	0	0	0	0	0	0	0	2	0
Franklin	8,000	6	21.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	1	0	1	1	0	0	0	2	0
Oneonta	*5,000	8	19.20	2	25.0	0	0	1	0	0	0	0	0	0	0	1	250.00	1	1	1	0	0	0	1	0	0	1	1
Worcester	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	0	0	0	0	1	0
Cazenovia	4,363	3	8.25	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	1	0
Brookfield	8,685	5	16.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	1	1	0	0	1	0
Canastota	2,500	4	19.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	2	1
Baldwinsville	3,000	4	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	0	0	1	1
SYRACUSE	*65,000	82	15.14	22	26.8	0	0	0	1	0	0	0	0	0	1	1	36.58	14	13	1	0	2	8	16	4	8	7	11
Cortland	7,361	6	9.78	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	2	1	0	0	0
Homer	3,000	6	21.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	2	0	1	0	1
Rest of District	....	132	....	15	11.4	2	0	3	1	0	0	0	2	0	5	0	100.00	28	13	0	7	4	11	17	5	4	22	8
WEST CENTRAL DIST:																												
AUBURN	*26,000	42	19.38	10	23.8	1	0	1	0	0	0	0	1	0	1	0	95.23	9	5	3	3	3	4	5	0	2	8	1
Ithaca	10,000	14	16.80	2	14.3	0	0	2	0	0	0	0	0	0	0	0	142.86	3	1	0	3	0	1	2	0	0	2	0
Waterloo	*4,500	10	26.66	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	2	1	0	1	0	0	0	1
Hector	5,000	2	4.80	2	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	0
Seneca Falls	6,853	5	8.75	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	0	0	1	0	1
Manchester	*4,000	6	18.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	[illegible]	4	0
Phelps	*7,000	10	17.14	2	20.0	0	0	1	0	0	0	0	0	0	0	0	100.00	1	1	0	0	1	1	0	0	0	5	0
Canandaigua	6,300	5	9.51	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	1	0	0	0	2	0	0	0	[illegible]	6	1
Geneva	*6,000	8	16.00	2	25.0	0	0	1	0	0	0	0	0	0	0	0	125.00	1	0	0	0	0	0	3	1	0	0	3

Attica	3,100	4	15.00	2	50.0	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	1	0	2		1
Penn Yan	4,500	9	24.00	1	11.1	0	0	0	0	0	0	0	0	0	0	0	......	1	1	0	0	0	1	3		0	1	1
Rest of District	....	111	....	10	9.1	0	0	0	0	0	0	1	0	0	0	0	9.09	12	20	3	5	2	11	17		4	25	4
LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	35	17.50	7	20.0	0	0	1	0	0	1	2	3	0	2	0	300.00	4	5	0	3	0	2	4	1	2	5	2
Richland	4,000	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	2	0
Fulton	*4,000	9	27.00	3	33.3	0	0	0	0	0	0	0	0	0	0	0	......	2	2	0	2	0	0	1	0	0	1	1
Lyons	*6,000	8	16.00	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00	2	2	0	2	0	0	0	0	0	1	
Newark	3,500	1	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	0
Palmyra	*4,800	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	......	2	1	0	0	0	0	2	0	0	1	0
Wolcott	3,753	5	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	2	0	0	0	0	2	0	0	1	0
ROCHESTER	*101,000	153	18.18	17	30.8	0	0	1	0	0	1	0	2	2	7	0	86.67	18	20	2	3	10	16	24	8	4	9	21
Brockport	4,500	6	16.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	......	0	2	0	0	0	1	1	0	0	1	1
Brighton	3,736	†5	16.12	1	20.0	0	0	0	0	0	0	0	0	0	1	0	......	1	0	0	1	0	0	0	1	0	1	0
Albion	*5,000	5	12.00	2	40.0	1	0	0	0	0	0	0	0	0	0	0	200.00	1	1	0	0	1	0	0	0	0	0	1
LOCKPORT	15,000	16	12.80	1	6.2	0	0	0	0	0	0	0	0	0	0	0	......	1	2	0	2	1	2	2	2	0	2	2
BUFFALO	*202,818	‡287	18.40	126	43.8	4	0	3	3	0	3	0	0	3	20	2	132.40	54	32	2	16	4	17	47	8	8	23	38
Tonawanda	*4,900	4	10.00	1	25.0	0	0	1	0	0	0	0	0	0	1	0	500.00	0	0	0	0	1	0	1	0	0	0	0
Amherst	4,518	4	10.67	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	0	2	0	1	0	0	0
Aurora	3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	4	0	0	0	1	0
Rest of District	....	133	....	23	17.7	2	0	0	2	0	3	0	0	2	8	0	115.40	17	21	4	8	6	8	20	5	1	24	4
Totals for the State	....	7,918	....	2,552	32.2	63	5	75	78	6	119	41	46	129	490	76	....	1,590	1,129	106	395	418	474	853	193	234	660	758

† Besides ten in Public Institutions.

‡ For four weeks ending March 27.

REMARKS.—The total reported mortality for the month is 7,918; of which 32.2 per cent were under the age of five years. From Zymotic diseases there were 1,108 deaths, a ratio per 1,000 total mortality of 138.67. The ratio per 1,000 of deaths from Typhoid fever is 9.47; from Diarrhœal diseases, 9.60; from Croup and Diphtheria, 61.88. From Typhus fever and Small Pox deaths are reported only from New York city. From Consumption the ratio of mortality is 142.59 per 1,000 deaths from all causes; and 210.00 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases, is 295.91. From Acute Respiratory diseases there were 200.81 deaths per 1,000, which is a little lower than that of February and March, 1885. The increased mortality over that of recent months is partly due to the addition to that of Buffalo, and partly to the receipt of returns from new boards of health.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system	Diseases of nervous system	Cancer	Accidents and violence	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	36	21.60	8	22.2	0	0	0	1	0	0	0	1	0	2	0	111.11	5	4	2	0	1	1	10	2	2	1	8
Candor	4,323	5	14.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	0	0	1	1	0
Waverly	*3,000	6	24.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	3	1
ELMIRA	25,000	30	14.40	5	16.7	0	0	0	0	0	0	0	0	1	0	0	33.33	10	8	0	4	0	0	2	1	2	2	0
Horseheads	3,500	1	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Bath	7,400	10	16.22	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	0	0	3	4
Olean	8,000	5	7.50	4	80.0	0	0	0	0	0	0	0	0	0	0	0	....	3	0	0	0	0	0	1	0	0	0	1
Jamestown	*12,000	12	12.00	1	8.3	0	0	0	0	0	0	0	0	0	0	0	....	2	0	1	2	0	2	1	2	1	0	1
Fredonia	2,800	6	25.71	0	......	1	0	0	0	0	0	0	0	0	0	0	166.67	0	0	0	0	0	0	2	0	1	2	0
Rest of District	....	54	....	10	18.5	2	0	1	0	0	1	0	1	0	0	0	92.50	6	7	0	6	0	3	16	2	2	6	1
EAST CENTRAL DIST:																												
Walton	3,541	6	20.34	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	1	0	0	1	1	2
Delhi	3,000	3	12.00	0	......	0	0	0	0	0	0	0	1	0	0	0	333.33	0	0	0	0	0	0	0	0	0	2	0
Franklin	3,000	6	21.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	1	0	1	1	0	0	0	2	0
Oneonta	*5,000	8	19.20	2	25.0	0	0	1	0	0	0	0	0	0	0	1	250.00	1	1	1	0	0	0	1	0	0	1	1
Worcester	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	0	0	0	0	1	0
Cazenovia	4,363	3	8.25	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	1	0
Brookfield	3,685	5	16.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	1	1	0	0	1	0
Canastota	2,500	4	19.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	2	1
Baldwinsville	3,000	4	16.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	0	0	0	0	0	1	1
SYRACUSE	*65,000	82	15.14	22	26.8	0	0	0	1	0	0	0	0	0	1	1	36.58	14	13	1	0	2	8	16	4	8	7	11
Cortland	7,361	6	9.78	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	2	1	0	0	0
Homer	3,000	6	24.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	2	0	1	0	1
Rest of District	....	132	....	15	11.4	2	0	3	1	0	0	0	2	0	5	0	100.00	28	13	0	7	4	11	17	5	4	22	8
WEST CENTRAL DIST:																												
AUBURN	*26,000	42	19.23	10	23.8	1	0	1	0	0	0	0	1	0	1	0	95.23	9	5	3	3	3	4	5	0	2	8	1
Ithaca	10,000	14	16.80	2	14.3	0	0	2	0	0	0	0	0	0	0	0	142.86	3	1	0	3	0	1	2	0	0	2	0
Waterloo	*4,500	10	26.66	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	2	1	0	1	0	0	0	1
Hector	5,000	2	4.80	2	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	0	0
Seneca Falls	6,853	5	8.75	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	0	0	1	0	1
Manchester	*1,000	6	14.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	2	0	0	4	0
Phelps	*7,000	10	17.14	2	20.0	0	0	1	0	0	0	0	0	0	0	0	100.00	1	1	0	0	1	1	0	0	0	5	0
Canandaigua	6,300	5	9.53	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	1	0	0	0	2	0	0	0		0	1
Geneva	*6,000	8	16.00	2	25.0	0	0	1	0	0	0	0	0	0	0	0	125.00	1	0	0	0	0	0	3	1	0	0	2

Attica	3,100	4	15.00	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1	0	0		1
Penn Yan	4,500	9	24.00	1	11.1	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	3		0	1	1
Rest of District	....	111	....	10	9.1	0	0	0	0	0	0	1	0	0	0	0	9.09	12	20	3	5	2	11	17		4	25	4
LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	35	17.50	7	20.0	0	0	1	0	0	1	5	3	0	2	0	200.00	4	5	0	3	0	2	4	1	2	5	2
Richland	4,000	3	9 00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	2	0
Fulton	*4,000	9	27.00	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	2	0	0	1	0	0	1	1
Lyons	*6,000	8	16.00	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00	2	2	0	2	0	0	0	0	0	1	
Newark	3,500	1	3.43	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
Palmyra	*4,800	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	2	0	0	1	0
Wolcott	3,753	5	16.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	2	0	0	1	0
ROCHESTER	*101,000	153	18.18	47	30.8	0	0	1	0	0	1	0	2	2	7	0	86.67	18	20	2	3	10	16	54	3	4	9	21
Brockport	4,500	6	16.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	1	0	0	1	1
Brighton	3,736	†5	16.12	1	20.0	0	0	0	0	0	0	0	0	0	1	0	....	1	0	0	1	0	0	0	1	0	1	0
Albion	*5,000	5	12.00	2	40.0	1	0	0	0	0	0	0	0	0	0	0	200.00	1	1	0	0	1	0	0	0	0	0	1
LOCKPORT	15,000	16	12.80	1	6.2	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	2	1	2	2	2	0	2	2
BUFFALO	*202,818	‡287	18.40	126	43.8	4	0	3	3	0	3	0	0	3	20	2	132.40	54	32	2	16	4	17	47	8	8	23	38
Tonawanda	4,900	4	10.00	1	25.0	0	0	1	0	0	0	0	0	0	1	0	500.00	0	0	0	0	1	0	1	0	0	0	0
Amherst	4,518	4	10.67	1	25.0	0	0	0	0	0	0	0	0	0	1	0	250.00	0	0	0	0	0	2	0	1	0	0	0
Aurora	3,000	5	20.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	4	0	0	0	1	0
Rest of District	....	133	....	23	17.7	2	0	0	2	0	3	0	0	9	8	0	115.40	17	21	4	8	6	8	20	5	1	24	4
Totals for the State	....	7,918	....	2,552	32.2	63	5	75	73	6	119	21	46	129	490	76	....	1,590	1,129	106	395	418	474	853	193	234	660	738

† Besides ten in Public Institutions.

‡ For four weeks ending March 27.

REMARKS.—The total reported mortality for the month is 7,918; of which 32.2 per cent were under the age of five years. From Zymotic diseases there were 1,108 deaths, a ratio per 1,000 total mortality of 138.67. The ratio per 1,000 of deaths from Typhoid fever is 9.47; from Diarrhœal diseases, 9.60; from Croup and Diphtheria, 61.88. From Typhus fever and Small Pox deaths are reported only from New York city. From Consumption the ratio of mortality is 142.59 per 1,000 deaths from all causes; and 210.00 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases, is 295.91. From Acute Respiratory diseases there were 200.81 deaths per 1,000, which is a little lower than that of February and March, 1885. The increased mortality over that of recent months is partly due to the addition to that of Buffalo, and partly to the receipt of returns from new boards of health.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during April, 1886.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of	Deaths under five years	Percentage of deaths under five years to total deaths	Cerebro-spinal fever.	Typhus fever.	Typhoid fever	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,439,037	2,965	24.72	1,075	36.3	21	1	17	37	6	49	10	17	71	196	55	160.54	501	511	33	118	196	163	299	62	113	226	267
BROOKLYN	*690,000	1,192	20.87	432	37.8	0	2	0	11	0	40	4	16	35	61	8	151.00	218	163	20	42	74	81	126	25	35	41	187
Gravesend	5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	......	2	1	0	0	0	0	1	0	0	0	0
New Lots	20,000	36	21.60	10	27.8	0	0	0	1	0	0	0	0	0	1	0	55.55	7	8	3	1	0	4	6	4	0	1	0
New Utrecht	4,742	6	15.20	1	16.7	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	1	2	1	0	0	0	1
LONG ISLAND CITY	*21,000	38	21.71	15	39.5	0	0	0	0	0	6	0	0	0	3	1	263.15	4	6	0	0	0	5	6	0	1	1	5
Newtown	*10,000	14	16.80	2	14.3	0	0	0	0	0	0	0	0	0	2	0	142.85	3	3	0	0	2	0	0	0	1	0	3
Oyster Bay	*12,000	12	12.00	2	16.7	0	0	0	0	0	0	0	0	0	0	0	......	1	1	0	0	2	2	2	0	1	1	2
Hempstead	18,160	12	8.00	3	25.0	0	0	0	0	0	1	0	0	0	0	0	83.33	1	1	0	0	0	1	1	1	0	2	3
North Hempstead	7,000	15	25.71	4	26.7	0	0	0	1	0	0	0	0	0	0	0	66.67	5	1	0	0	1	2	3	0	1	1	0
Babylon	4,739	10	25.55	8	30.0	0	0	0	0	0	2	0	0	0	0	0	200.00	0	0	0	1	0	2	4	0	0	1	0
Southold	7,267	5	8.00	4	80.0	0	0	0	0	0	0	0	0	0	1	0	200.00	1	0	0	1	0	1	0	0	0	0	1
Sag Harbor	3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	......	0	2	0	1	0	0	1	0	0	0	0
Edgewater	10,000	19	22.80	5	26.3	1	0	0	0	0	0	0	0	0	0	0	52.67	1	4	2	2	1	1	4	0	1	1	1
Northfield	7,014	14	24.00	7	50.0	0	0	0	0	0	0	0	0	0	0	0	......	1	5	0	2	2	0	3	0	0	0	1
Westfield	5,289	9	20.42	4	44.5	0	0	0	0	0	0	0	0	0	1	2	333.33	3	0	0	0	0	1	0	0	1	1	0
YONKERS	*22,000	22	12.00	10	45.5	0	0	0	0	0	0	0	0	0	3	0	136.36	3	8	0	0	2	2	7	0	0	1	1
Westchester	*6,900	10	17.40	2	20.0	0	0	0	0	0	0	0	0	0	0	0	......	2	2	0	0	0	2	0	1	0	1	2
Mount Vernon	*5,000	11	26.40	0	......	0	0	0	0	0	0	0	0	0	0	0	......	3	2	1	0	1	0	2	0	1	1	0
Sing Sing	*6,500	15	27.69	4	26.7	0	0	0	0	0	0	1	0	0	0	0	66.67	0	5	0	0	0	3	1	0	1	2	2
New Rochelle	5,279	8	18.18	3	37.5	0	0	0	0	0	0	0	0	0	2	0	250.00	2	2	0	0	0	0	0	0	0	1	1
Rest of district	......	54	......	12	22.2	0	0	0	2	1	1	0	0	0	1	0	92.60	6	11	1	4	3	9	7	2	1	4	1
HUDSON VALLEY DIST:																												
ALBANY	96,000	211	26.30	72	34.1	2	0	7	0	0	0	0	1	0	20	2	444.45	36	46	1	22	7	25	12	6	5	8	11
West Troy	13,000	28	26.85	5	17.8	0	0	0	0	0	0	1	0	1	0	0	71.48	10	5	0	2	0	4	1	1	1	0	2
Hoosick Falls	*4,000	11	33.00	4	36.4	1	0	0	0	0	0	0	0	0	0	1	181.81	0	3	0	0	0	1	1	1	1	1	1
TROY	*60,000	145	29.00	43	29.7	3	0	8	1	0	5	6	3	0	7	2	241.38	36	18	2	7	5	12	6	6	4	6	8
Lansingburgh	*9,700	20	24.71	7	35.0	0	0	1	0	0	0	1	0	0	0	0	100.00	3	5	0	3	0	1	4	0	1	1	0
Green Island	*5,000	8	19.20	4	50.0	0	0	0	0	0	0	0	0	0	1	0	125.00	1	2	0	0	0	3	1	0	0	0	0
Greenbush	*7,200	10	16.67	3	30.0	0	0	0	0	0	0	0	0	0	0	0	......	3	8	0	1	0	2	0	0	0	0	1
Coxsackie	4,000	10	30.00	3	30.0	0	0	0	0	0	0	0	0	1	0	0	100.00	1	2	0	2	1	0	1	0	0	1	1
Catskill	*4,500	6	16.00	1	16.7	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	0	0	2	1	0	1	0	0

HUDSON	*10,000	19	23.80	9	47.4	0	0	0	0	0		0	0	1	1	1	105.26	6	3	0	1	2	1	2	0	1		0
KINGSTON	21,100	28	15.92	14	50 0	3	0	0	0	0		0	0	0	2	0	....	5	0	2	2	1	4	4	1	1		0
Wawarsing	3,547	9	12.63	2	22.2	1	0	0	0	0	0	0	0	0	0	0	111.11	4	2	0	0	0	0	0	0	0		2
Rosendale	5,000	6	14.40	3	50.0	0	0	0	0	0	0	1	0	0	0	0	166.67	1		0	0	0	0	0	0	0		3
Marbletown	4,000	6	18.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	2		0	1	0	0	1	0	0		1
Esopus	4,736	3	8.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	0	0	0		0
Saugerties	*4,000	16	48.00	4	25.0	0	0	0	0	0	1	0	0	0	2	0	187.50	2	2	2	2	0	0	1	2	1		1
POUGHKEEPSIE	20,200	51	30.29	17	33.3	0	0		0	0	0	0	0	5	2	0	137.25	4	9	2	0	2	4	10	0	2		4
Fishkill	10,732	16	18.00	8	50.0	0	0		0	0	0	0	0	0	2	0	187.50	6	3	0	0	0	0	2	0	1		0
Wappinger Falls	5,000	4	9.60	0	....	0	0		0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	2	0	0		1
NEWBURGH	20,000	29	17.40	7	24.1	1	0		0	0	0	0	0	0	0		103.45	3	5	0	2	2	3	7	0	0		2
Port Jervis	9,000	10	13.33	1	10 0	0	0		0	0	0	0	0	0	0		....	0	0	0	0	1	2	1	0	2		3
Middletown	10,000	19	21.60	1	5.5	0	0		0	0	0	0	0	0	1		55.55	3	3	0	2	2	2	3	1	1	1	0
Goshen	4,387	9	24.61	1	11.1	0	0		0	0	0	0	0	0	0		....	2	4	0	0	0	1	1	0	0	1	0
Haverstraw	7,000	8	5.18	0	....	0	0			0	0	0	0	0	1		666.67	0	0	0	1	0	0	0	0	0	0	0
Ramapo	5,000	8	19.20	2	25.0	0	0			0	0	0	0	1	0		125.00	2	2	0	0	0	0	2	0	0	1	0
Rest of district	....	201	....	45	22.5		0			0				2	1		140.11	31	32	2	16	10	13	23	1	10	29	15
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	6	19.45	0	....	0	0		0	0	0	0	0	0	0	0	....	0	1		1	0	1	2	0	0		1
Greenwich	3,861	4	12.43	0	....	0	0		0	0	0	0	0	0	0	0	....	1	0		0	0	1	0	1	0		0
Salem	3,500	6	20.56	0	....	0	0		0	0	0	0	0	0	0	0	....	1	0		0	0	0	2	2	0		1
Fort Ann	4,367	2	5.62	1	50.0	0	0		0	0	0	0	0	0	0	0	....	0	0		0	0	0	0	0	0		1
Fort Edward	4,380	1	2.68	0	....	0	0		0	0	0	0	0	0	0	0	....	0	0		0	0	0	0	0	0		0
Queensbury	10,000	18	21.60	2	11.1	0	0		0	0	0	0	0	0	0	0	....	2	4	0	2	0	2	3	1	1	2	1
Port Henry	2,525	2	10.00	1	50.0	0	0		0	0	0	0	0	0	0		....	0	0	0	0	0	0	2	0	0	0	0
Malone	7,908	14	21.26	8	57.1	0	0		0	0	0	0	0	0	3		285.70	4		0	0	0	0	0	0	0	0	3
OGDENSBURG	11,000	11	12.00	2	18.2	1	0		0	0	0	0	0	0	1	0	181 82	0		0	2		2	1	0	0		0
Gouverneur	*5,500	13	28.36	2	15.2	1	0	1	0	0	0	0	1	0	0	0	307.65	2		0	1		1	0	1	2		1
Ellisburgh	4,812	4	10.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	1		0	0		0	0	0	0	1	0
Plattsburgh	7,000	6	10.29	3	50.0	0	0	0	0	0	0	0	0	0	1	0	166.67	0		0	2		0	2	0	0	0	0
WATERTOWN	12,209	21	20.62	3	14.3	0	0	0	0	0	0	0	0	0	0	0	....	1		0	2		1	6	1	1	3	3
Cape Vincent	3,143	3	11.45	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0		1	0		1	0		0	1	0
Clayton	4,214	6	17.15	0	....	0	0	0	2	0	0	0	0	0	0	0	333.33	0		0	0		0	1		0	3	0
Rest of district	....	117	....	21	18.0	2	0	1	0	0	3	6	2	1	0	0	128.20	9	17	5	10		3	14	5	6	16	18
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	29	23.20	7	24.2	0		3	2	0	1	0	0		0	0	206.90	4	2	1	1	2	2	3	2	1	3	2
Schoharie	3,350	3	10.75	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	0	0	0	1	0	0
Cobleskill	3,371	2	7.12	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	1	0	0	0
Middleburgh	3,376	6	21.32	2	33.3	0	0		0	0	0	0	0	0	0	0	....	1	0	0	1	1	1	0	1	0	0	0
AMSTERDAM	14,000	21	18.00	5	23.8	1	0		0	0	0	0	0	0	0	0	95.24	7	3	1	0	1	1	4	0	0	0	2
Johnstown	*6,000	18	36.00	1	5.5	1	0		0	0	0	0	1	0	0	0	166.67	2	2	0	2	0	3	2	0	0	2	2
Gloversville	*8,000	18	27.00	9	50.0	0	0	1	0	0	1	0	0	0	5	1	444.45	3	0	0	0	0	1	5	0	0	0	1
Little Falls	7,300	6	10.00	1	16.7	0	0	0	0	0	1	0	0	0	0	0	166.67	0	1	0	1	1	1	0	0	0	0	1
Ilion	4,200	1	2.86	1	100.	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	1
Herkimer	3,000	1	4.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
UTICA	*39,000	58	17.85	24	41.4	5	0		0	0	0	0	0	0	3	1	172.41	6	6	0	5	2	3	16	0	0	3	7
Boonville	4,000	4	12.00	1	25.0	0	0		0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	2	0	0	0	0
Camden	3,400	5	17.65	0	....	0	0		0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	2	2	0
Waterford	4,326	5	13.87	0	....	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	1	0	1	0	0	0	1	0
Ballston Spa	3,300	5	18.18	2	40 0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	1	0	1	1	0	0	0	0
Saratoga Springs	10,000	18	21.60	5	27 8	0	0	0	1	0	0	0	1	0	0	0	111.11	6	1	0	1	2	0	0	0	0	3	8
Rest of district	....	81	....	10	12.3	0	0	4	0	0	0	0	0	1	0	0	61.73	6	14	2	6	4	1	8	1	8	18	8

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during April, 1886.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years	Percentage of deaths under five years to total deaths	Cerebro-spinal fever.	Typhus fever.	Typhoid fever	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,439,037	2,965	24.72	1,075	36.3	21	1	1[illegible]	37	6	49	10	17	71	196	55	160.54	501	511	33	118	196	163	299	62	113	226	267
BROOKLYN...........	*690,000	1,192	20.87	432	37.8	0	2	0	14	0	40	4	16	35	61	8	151.00	218	163	20	42	74	81	126	25	35	41	187
Gravesend...	5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	1	0	0	0	0
New Lots.............	20,000	36	21 60	10	27.8	0	0	0	1	0	0	0	0	0	1	0	55.55	7	8	3	1	0	4	6	4	0	1	0
New Utrecht..........	4,742	6	15.20	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	2	1	0	0	0	1
LONG ISLAND CITY.	*21,000	38	21.71	15	39.5	0	0	0	0	0	6	0	0	0	3	1	263.15	4	6	0	0	0	5	6	0	1	1	5
Newtown	*10,000	14	16.80	2	14.3	0	0	0	0	0	0	0	0	0	2	0	142.85	3	3	0	0	2	0	0	0	1	0	3
Oyster Bay............	*12,000	12	12.00	2	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	2	2	2	0	1	1	2
Hempstead............	18,160	12	8.00	3	25.0	0	0	0	0	0	1	0	0	0	0	0	83.33	1	1	0	0	0	1	1	1	0	2	3
North Hempstead....	7,000	15	25.71	4	26.7	0	0	0	1	0	0	0	0	0	0	0	66.67	5	1	0	0	1	2	3	0	1	1	0
Babylon...............	4,739	10	25.55	3	30.0	0	0	0	0	0	2	0	0	0	0	0	200.00	0	0	0	1	0	2	4	0	0	1	0
Southold.......	7,267	5	8.00	4	80.0	0	0	0	0	0	0	0	0	0	1	0	200.00	1	0	0	1	0	1	0	0	0	0	1
Sag Harbor...........	3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	....	0	2	0	1	0	0	1	0	0	0	0
Edgewater............	10,000	19	22.80	5	26.3	1	0	0	0	0	0	0	0	0	0	0	52.67	1	4	2	2	1	1	4	0	1	1	1
Northfield............	7,014	14	24.00	7	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	5	0	2	2	0	3	0	0	0	1
Westfield	5,280	9	20 42	4	44.5	0	0	0	0	0	0	0	0	0	1	2	333.33	3	0	0	0	0	1	0	0	1	1	0
YONKERS..............	*22,000	22	12.00	10	45.5	0	0	0	0	0	0	0	0	0	3	0	136.36	3	3	0	0	2	2	7	0	0	1	1
Westchester	*6,900	10	17.40	2	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	0	2	0	1	0	1	2
Mount Vernon.........	*5,000	11	26.40	0	......	0	0	0	0	0	0	0	0	0	0	0	....	3	2	1	0	1	0	2	0	1	1	0
Sing Sing.....	*6,500	15	27.69	4	26.7	0	0	0	0	0	0	1	0	0	0	0	66.67	0	5	0	0	0	3	1	0	1	2	3
New Rochelle........	5,279	8	18.18	3	37.5	0	0	0	0	0	0	0	0	0	2	0	250.00	2	2	0	0	0	0	0	0	0	1	1
Rest of district........	....	54	....	12	22.2	0	0	0	2	1	1	0	0	0	1	0	92.60	6	11	1	4	3	9	7	2	1	4	1
HUDSON VALLEY DIST:																												
ALBANY	96,000	211	26.30	72	34.1	2	0	7	0	0	0	0	1	0	20	2	444.45	86	46	1	22	7	25	12	6	5	8	11
West Troy.............	13,000	28	26.85	5	17.8	0	0	0	0	0	0	1	0	1	0	0	71.43	10	5	0	2	0	4	1	1	1	0	3
Hoosick Falls..........	*4,000	11	33.00	4	36.4	1	0	0	0	0	0	0	0	0	0	1	181.81	0	3	0	0	0	1	1	1	1	1	1
TROY....................	*60,000	145	29.00	43	29.7	3	0	8	1	0	5	6	3	0	7	2	211.38	36	18	2	7	5	12	6	6	4	6	8
Lansingburgh.	*9,700	20	24.74	7	35.0	0	0	1	0	0	0	1	0	0	0	0	100.00	3	5	0	3	0	1	4	0	1	1	0
Green Island..........	*5,000	8	19.20	4	50.0	0	0	0	0	0	0	0	0	0	1	0	125.00	1	2	0	0	0	3	1	0	0	0	0
Greenbush..............	[illegible]	10	16.67	5	50.0	0	0	0	0	0	0	0	0	0	0	0	....	3	2	0	1	0	2	0	0	0	0	1
Coxsackie..............	4,000	10	30.00	3	30.0	0	0	0	0	0	0	0	0	1	0	0	100.00	1	2	0	2	1	0	1	0	0	1	1
[illegible]........................	[illegible]	6	16.00	1	11.7	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	0	0	2	1	0	1	0	0

Geneva	*6,000	9	18.00	3	33.3	0	0	0	0	0	0	0	0	0	0	1	111.11	0	1	0	1	0	0	2	1	0	2	1
Attica	3,100	2	7.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	0	1	0	0	0	0
Penn Yan	4,500	11	29.33	0	......	0	0	0	0	0	1	0	0	0	0	0	90.91	2	2	0	0	0	2	2	0	0	2	0
Le Roy	3,600	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Rest of district	....	93	....	12	12.9	1	0	0	1	0	0	0	0	2	0	1	53.76	7	20	1	4	2	6	14	7	1	18	8
LAKE ONTARIO AND WESTERN DISTRICT																												
OSWEGO	*24,000	26	13.00	5	19.2	0	0	2	0	0	0	0	0	0	0	0	76.92	6	4	0	0	1	0	3	1	0	2	7
Richland	4,000	3	9.00	1	33.3	0	0	0	0	0	0	0	0	1	0	0	333.33	0	0	0	0	0	2	0	0	0	0	0
Fulton	*4,000	4	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	1	0	0	1	0
Lyons	*6,000	11	20.00	3	30.0	0	0	0	0	0	1	0	0	0	0	0	100.00	2	4	0	1	0	1	1	0	0	0	0
Newark	3,500	3	10.30	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1	0	0	1	0
Palmyra	*4,800	9	22.50	2	22.2	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	1	0	2	0	0	1	2
Wolcott	3,753	2	7.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	1	0	0
Clyde	3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	1	0	0	0	0	0	0
ROCHESTER	*101,000	148	17.52	35	23.7	0	0	3	1	0	2	0	1	0	15	2	162.16	17	23	1	7	9	8	26	1	6	9	17
Brockport	4,500	5	13.34	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	2	1	0	0	1
Greece	*5,000	9	21.60	1	11.1	0	0	0	1	0	0	0	1	0	0	0	222.22	2	1	0	0	0	1	0	2	0	0	1
Mendon	3,200	4	15.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	0	0	0	1	0
Brighton	3,736	‡5	16.10	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	2	0	0	2	0
Albion	*5,000	3	7.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	1	0	0	1	0
LOCKPORT	*15,000	16	12.80	0	.....	2	0	0	0	0	0	1	0	0	1	0	250.00	4	1	0	0	0	2	1	0	1	1	2
BUFFALO	*202,818	§272	17.68	119	43.8	12	0	5	2	0	3	0	2	0	15	1	147.05	38	35	1	12	3	17	51	11	9	10	45
Tonawanda	4,900	7	17.15	2	28.6	0	0	1	0	0	0	0	0	0	0	1	285.71	3	0	0	1	0	0	0	0	1	0	0
Amherst	4,518	1	2.67	0	......	0	0	1	0	0	0	0	0	0	0	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Aurora	3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	1
Rest of district	....	114	....	18	15.8	1	0	1	3	0	3	0	0	0	2	0	87.71	20	15	0	10	6	5	10	3	2	22	11
Totals for the State	....	7,181	....	2,281	......	63	3	69	75	8	129	82	49	123	380	59	....	1,188	1,125	90	353	385	483	830	173	251	550	733

† Besides ten deaths in Soldiers' Home. ‡ Besides five in Monroe County Hospital. § For four weeks ending April 24.

REMARKS.—The total reported mortality for the month of April is 7,181; of which 31.8 per cent were under the age of five years. From Zymotic diseases there were 1,020 deaths, a ratio per 1,000 total mortality of 142, or about one in seven. The ratio per 1,000 of deaths from Typhoid fever is 9.61; from Diarrhœal diseases, 12.40; from Croup and Diphtheria, 52.92. One death from small-pox occurred in Syracuse, and one among the aqueduct laborers at New Castle, Westchester county, no further spread of the disease being reported. From Consumption the ratio of mortality is 156.66 per 1,000 deaths from all causes; and 229.66 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases is 311.24. From Acute Respiratory diseases there were 165.48 deaths per 1,000. There have been 233 delayed returns received for the month of March, thirty-four of which are from Cohoes.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhoeal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhoeal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
BINGHAMTON	*20,000	27	16.20	7	26.0	0	0	0	0	0	0	0	0	0	1	0	37.03	2	4	1	0	0	5	9	0	2	1	2
Candor	4,323	2	5.55	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	1	0
ELMIRA	25,000	34	16.82	8	23.5	0	0	1	0	0	0	0	0	1	0	0	58.82	7	6	0	1	3	1	4	0	2	3	5
Horseheads	3,500	4	13.71	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	1	1
Hornellsville	10,000	7	8.40	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	1	0	0	0	0	2	1
Bath	7,400	† 4	6.48	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	2	0	0	0	0	0	2
Olean	8,000	6	9.00	4	66.7	0	0	0	0	0	1	0	0	0	1	1	500.00	2	0	0	0	0	0	0	0	0	1	0
Jamestown	*12,000	11	11.00	1	9.1	0	0	0	0	0	0	0	0	0	0	0	....	1	3	0	0	1	3	2	0	0	0	1
Westfield	3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1	0	0	1	0
Rest of district	....	50	....	7	14.0	0	0	2	0	0	1	0	0	0	0	0	60.00	6	4	0	2	3	3	3	3	6	9	8
EAST CENTRAL DIST.:																												
Walton	3,541	4	13.56	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	1	0	1	0
Delhi	3,000	5	20.00	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	1	1	0	0	1	1	0	0	0	0	0
Liberty	3,209	3	11.25	1	33.3	0	0	0	0	0	0	0	0	0	1	0	333.33	2	0	0	0	0	0	0	0	0	0	0
Oneonta	*5,000	15	36.00	5	33.3	0	0	0	0	0	0	0	0	0	0	0	....	4	1	1	1	1	2	2	1	0	1	1
Worcester	*3,000	1	4.00	1	10.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Cazenovia	4,363	6	16.50	1	16.7	1	0	0	0	0	0	0	0	0	0	0	166.67	2	2	0	0	0	0	0	0	0	0	1
Oneida	5,000	7	16.80	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	1	1	1	0	0	0	1	1	0	1	1
Brookfield	3,685	5	16.28	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	1	0	0	0	1
Baldwinsville	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
SYRACUSE	*67,000	107	17.67	32	30.0	1	0	1	1	1	0	0	1	0	8	0	121.49	28	17	0	10	0	10	16	4	2	5	2
Geddes	7,000	14	24.00	4	28.6	0	0	0	0	0	0	0	1	0	0	0	71.42	3	3	0	0	1	1	3	0	0	1	1
Cortland	7,361	5	8.15	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	2	0	0	1	0
Homer	3,000	5	20.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	1	0	0	2	1
Rest of district	....	137	....	16	11.7	0	0	1	1	0	0	0	0	0	0	0	7.30	23	15	1	12	8	10	13	5	5	30	14
WEST CENTRAL DIST.:																												
AUBURN	*26,000	37	17.08	5	13.5	0	0	0	0	0	0	0	0	0	2	1	81.08	3	5	1	2	2	7	8	1	1	1	4
Ithaca	10,000	11	13.20	3	27.3	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	2	0	0	4	2
Waterloo	*4,500	3	8.00	0	......	0	0	0	1	0	0	0	0	0	0	0	333.33	0	1	0	0	0	0	0	0	0	0	1
Hector	5,000	4	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	0	0	1	1	0
Seneca Falls	6,858	7	12.23	1	14.3	0	0	0	1	0	0	0	0	0	0	1	285.71	1	0	0	2	0	0	1	0	0	0	1
Manchester	*4,000	7	21.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	0	0	0	4	1
Phelps	*7,000	6	10.29	1	16.7	0	0	1	0	0	0	0	0	0	0	0	166.67	2	0	0	1	0	0	0	0	0	2	0
Canandaigua	6,300	5	9.64	3	60.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	3	3	0	0	2	0

Hudson	*10,000	16	19.20	7	43.8	0	0	0	0	0	0	0	0	0	0	0	....		1		1	1	1	4	1	2	1	2
Kingston	20,000	24	14.40	7	29.2	2	0	0	0	0	0	0	0	0	2	1	208.33		2		3	1	3	0	0	3	2	1
Wawarsing	8,547	7	10.00	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....		0		0	0	2	0	0	0	2	2
Rosendale	5,000	7	16.80	1	14.3	0	0	0		0	0	0	0	0	0	0	142.86		0		0	0	0	0	0	0	0	5
Esopus	4,736	7	18.00	1	14.3	0	0	0	2	0	0	0	0	0		0	285.71				0	0	1	0	0	0	0	0
Saugerties	*4,000	8	24.00	3	37.5	0	0	0	0	0	0	0	0	0		0	125.00				2	0	1	0	0	0	0	2
Poughkeepsie	20,200	39	23.16	12	30.7	0	0	0	0	0	0	0	0	5		0	128.20		6		2	2	3	4	4	2	5	2
Wappinger Falls	*5,000	5	12.00	3	60.0	0	0	0		0	0	0	0	0		0	200.00		0		1	0	0	0	0	1	0	1
Newburgh	*20,000	22	13.20	9	40.9	0	0	0		0	0	0	0	0		0	....		3		1	3	1	5	1	0	0	8
Port Jervis	*10,000	13	15.60	4	30.7	0	0	0		0	0	0	0	0		0	....	0	1		0	2	2	1	0	0	1	5
Middletown	*10,000	7	8.40	2	28.5	0	0	0		0	0	0	0	0		1	142.85	0	1		1	0	0	1	0	1	0	2
Goshen	4,387	7	19.15	1	14.3	0	0	0		0	0	0	0	0	0		....	0	2		0	0	0	0	0	1	3	1
Haverstraw	*7,000	8	13.71	2	25.0	0	0	0		0	0	0	0	0	0		250.00	1	2		0	0	0	0	0	0	2	1
Orangetown	8,077	9	12.50	0	......	0	0	0		0	0	0	0	0			222.22	0	0		0	2	1	0	0	1	1	0
Ramapo	5,000	5	12.00	1	20.0	0	0	0			0	0	0	0			.....	1	3		0	0	0	0	0	0	1	0
Rest of district	....	168	....	30	18.0	0	0	1			2	0	1	3			131.00	13	31		14	4	14	19	4	15	24	8
Adirondack & Northern District:																												
Argyle	3,700	6	19.45	0	.....	0	0	2	0		0	0	0	0	0	0	333.33		0	0	1	0	1	0				0
Greenwich	3,861	3	9.33	1	33.3	0	0	0	0		0	0	0	0	0	0	....		0	0	0	0	0	1	1		0	0
Salem	3,500	7	24.00	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....		3	0	2	0	1	0	1		0	0
Fort Edward	4,880	2	5.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....		1	0	0	0	1	0	0		0	0
Queensbury	10,000	7	10.80	3	42.8	0	0	0	0	0	0	0	0	0	1	0	142.86		0	0	0	0	2		1	1	0	0
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0		0	0	0	0	0	....		0		0	0	0		0	0	0	0
Port Henry	2,525	3	14.25	1	33.3	0	0	1	0	0	0	0	0	0	0	0	333.33		0		0	0	0	1	0	0	0	1
Malone	7,908	3	....	1	33.3	0	0		0	0	0	0	0	0	0	0	....				0	0	0	1	0	0	1	0
Ogdensburg	11,000	15	16.37	6	40.0	0	0		0	0	0	0	0	0	1	3	333.33				0	1	0	1	1	0	1	2
Gouverneur	5,500	7	15.27	2	28.6	2	0		0	0	0	0	0	0	1	0	428.58				0	2	0	0	0	1	0	1
Ellisburgh	4,812	4	10.00	0	......	0	0			0	0	0	0	0	0	0	....				0	0	1	1	0	0	1	0
Plattsburgh	7,000	12	20.57	8	66.6	0	0			0	0	0	0	0	0	0	....				1	1	2	2	0	0	1	8
Cape Vincent	3,143	4	15.24	1	25.0	0	0		0	0	0	0	0	0	0	0	....	1	0		0	0	0	0	0	0	2	1
Clayton	4,214	5	14.29	0	......	0	0		0	0	0	0	0	0	2	0	400.00	1	1		1	0	0	0	0	0	0	0
Rest of district	....	98	....	25	25.4	0	0		0	0		2		4	1		140.00	16	14		9	2	8	10	4	6	9	6
Mohawk Val. Dist.:																												
Schenectady	15,000	29	23.20	8	27.5	0	0		0	0	0	0	0	0	3	0	172.35		3			2	5	8	2		2	1
Middleburgh	3,376	3	10.67	0	......	0	0		0	0	0	0	0	0	0	0	....		0			0	0	0	1		1	0
Amsterdam	14,000	9	7.71	2	22.2	1	0		0	0	0	0	0	0	0	0	111.11		3		0	0	1	0	6		0	0
Johnstown	*6,000	13	26.00	3	23.0	0	0	1	0	0	1	0	0	0	0	0	153.85		0		2	1	1	2	0		1	2
Gloversville	*8,000	11	16.50	5	45.5	0		0	1	0	1	0	0	0	1	0	272.72		1		1	0	2	0	1	0	0	1
Little Falls	7,300	10	16.44	0	......	0		0	0	0	0	0	0	0	0	0	100.00		3		1	1	0	2	1	0	1	0
Ilion	4,200	3	8.57	2	66.6	0		0	0	0	0	0	0	0	0	0	....		0		0	0	0	1	0	0	0	1
Herkimer	3,000	6	24.00	1	16.6	0		0	0	0	0	0	0	0	0	0	....		1	0	0	1	0	2		0		1
Utica	*39,000	53	16.31	9	17.0	2		0	0	0	0	0	0	0	4	3	170.00		14	1	2	1	4	5		3		1
Rome	12,045	18	18.00	2	11.1	1		0	0	0	0	0	0	0	0	0	55.55		2	0	0	0	1	2		0	5	2
Boonville	4,000	7	21.00	3	42.8	0		0	0	0	0	0	0	2	0	0	285.72		0	0	0	0	0	0		0	1	2
Camden	3,400	4	14.12	0	......	0	0	0	0	0	0	0	0	0	0	0	....		1	0	0	0	0	0		0	0	1
Waterford	4,326	6	16.65	2	33.3	0	0	0	0	0	0	0	0	0	1	0	166.67		1	0	0	1	0	3		0	0	0
Ballston Spa	3,300	5	14.55	0	......	0	0	0	0	0	0	0	0	0	0	0	....		1	0	0	0	1	0		0	1	0
Saratoga Springs	10,000	17	20.40	5	29.4	0	0	0	0	0	0	0	0	0	0	0	....		2	0	4	1	2	2		0	2	8
Rest of district	....	54	....	12	22.2	0	0	0		0	2	0	1	0	0	1	92.60		8	0	5	0	5	7		3	9	5
Southern Tier Dist.:																												
Binghamton	*20,000	28	16.80	4	14.3	0	0	0	1		0	1	0	0	2	0	142.85		6		2		2			4	1	6
Candor	4,323	2	5.55	1	50.0	0	0	0	0		0	0	0	0	0	0	....		0		0		0			0	1	0
Elmira	*25,000	19	8.72	2	11.1	0	0		0		0	0	0	0	1	0	111.11		2		3		4			1	0	0

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOU. TIER DIST. (*Con.*):																												
Bath	7,400	5	8.10	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	1	1	0	0	1	1
Olean	*8,000	7	10.50	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	2	0	0	2	0	1	2	0
JAMESTOWN	*12,000	15	15.00	5	33.3	0	0	0	0	0	0	0	0	0	0	2	111.11	3	1	0	2	1	1	2	1	1	1	0
Westfield	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Rest of district	....	52	....	6	11.5	0	0	0	0	0	1	0	1	0	0	1	....	4	8	0	5	0	5	7	3	3	9	5
EAST CENTRAL DIST.:																												
Walton	3,511	3	10.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	1	0	0	0	0	1	0
Franklin	3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	2	0
Cooperstown	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	0
Liberty	3,209	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	2
Oneonta	*5,000	6	14.40	3	50.0	0	0	0	0	0	0	0	0	0	0	0	....	5	0	0	0	0	0	0	0	0	0	1
Worcester	*3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	1	1	0	0	0	1
SYRACUSE	65,000	105	19.38	28	26.6	1	0	2	0	0	0	0	2	0	1	0	57.14	20	20	1	9	8	11	17	8	4	5	6
Cortland	7,361	6	11.80	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	2	0	2	0
Homer	3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	2	1
Rest of district	....	103	....	10	9.0	0	0	5	0	0	0	0	0	1	1	1	76.20	7	8	5	7	6	11	14	6	6	19	8
WEST CENTRAL DIST.:																												
AUBURN	*26,000	35	16.15	9	24.8	3	0	0	1	0	0	0	0	0	1	0	57.14	5	8	0	0	4	3	4	0	1	1	4
Groton	3,450	2	7.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	0	0	0	0	0
Ithaca	*10,000	11	13.20	1	9.1	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	2	3	1	0	2	1
Waterloo	*4,500	5	13.33	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	1	0	0	0	0	1	0	0	2	0
Hector	5,000	6	14.40	1	16.7	0	0	2	0	0	0	0	1	0	0	0	500.00	0	0	0	0	1	0	0	0	1	1	0
Seneca Falls	*6,758	15	26.65	0	......	0	0	0	1	0	0	0	0	0	0	0	66.67	0	1	0	2	1	2	1	0	2	2	0
Manchester	*4,000	3	9.00	1	33.3	1	0	0	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	1	0	0	1	0
Phelps	*7,000	5	8.57	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	1	1	1	0	0	0	0	0	0
Canandaigua	6,300	3	6.00	1	33.3	0	0	0	0	0	0	0	0	0	0	2	666.66	0	0	0	0	0	0	1	0	0	0	0
Geneva	*6,000	9	18.00	1	11.1	0	0	0	0	0	0	0	0	0	0	0	....	0	3	1	2	0	0	0	1	2	0	0
Attica	3,100	2	7.75	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	1	0	0
Penn Yan	4,500	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	1	1
Rest of district	....	77	....	5	6.5	0	0	0	0	0	1	0	0	0	0	0	13.00	2	15	1	4	3	6	10	0	6	10	9

LAKE ONTARIO AND WESTERN DISTRICT																												
OSWEGO	*24,000*	31	15.50	11	35.5	0	0	0	2	0	0	0	0	0	0	0	64.51	2	3	0	2	2	3	6	0	2	2	7
Fulton	*4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	1	0
Lyons	*6,000	7	14.00	1	14.2	0	0	0	1	0	0	0	0	0	0	0	142.86	0	0	0	0	1	0	2	0	1	1	1
Newark	3,500	13	10.30	1	33.3	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	2	0	0	0	0
Palmyra	*4,800	2	5.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	1	0	0	0	0	0
Clyde	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	1	0
Wolcott	3,733	4	12.80	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	2	0	1	0	0	0	0	0	0	1
ROCHESTER	*101,000	131	15.56	45	34.3	0	0	3	0	0	0	0	0	0	13	2	137.40	20	27	0	3	4	9	23	5	8	2	12
Brockport	4,500	5	13.35	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	1	0	1	1	0	1	0
Mendon	3,200	2	7.50	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	1	0
Brighton	3,736	9	28.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	3	0	1	1	1	0	2	0
Albion	*5,000	5	12.00	1	20.0	0	0	1	0	0	0	0	0	0	0	0	200.00	1	1	0	1	0	0	0	0	1	0	0
BUFFALO	*202,818	371	22.00	97	26.1	9	0	2	1	0	4	0	2	5	9	6	102.43	81	50	1	17	7	21	26	9	10	13	138
Tonawanda	4,900	9	7.35	7	77.7	0	0	0	0	0	0	0	0	0	1	0	111.11	2	0	0	1	0	1	1	0	1	0	2
Amherst	4,518	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	1	0	0	0	0	1	1
Hamburg	3,235	2	7.42	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	2	0	0	0	0	0	0	0	0	0
Rest of district	......	90	......	23	25.5	0	0	1	0	0	1	0	1	0	0	0	33.33	7	13	2	8	4	10	11	2	8	15	7
Totals for the State	......	6,659	......	2,044	......	55	....	45	75	5	116	37	43	89	394	123	......	835	1,085	73	355	363	443	711	186	331	145	850

REMARKS.—The total reported mortality for the month of May is 6,659, of which 31.7 per cent were under the age of five years. From Zymotic diseases there were 982 deaths, a ratio per 1,000 total mortality of 147.45. The ratio per 1,000 of deaths from Typhoid fever is 6.75; from Diarrhœal diseases, 18.46; from Croup and Diphtheria, 59.15. Diphtheria has been epidemic in New Rochelle, Bethlehem and North Hempstead, the latter originating from a school-house. One case of small-pox has been reported from Gravesend; deaths occurred only in New York city. No deaths from Typhus fever are reported. The other principal preventable diseases were Scarlet fever and Whooping cough. From Consumption the ratio of mortality is 162.91 per 1,000 deaths from all causes; and 235.61 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases is 321.82. From Acute Respiratory diseases there were 125.88 deaths per 1,000. There were 162 delayed returns received for April, from Cohoes, Fort Edward, Baldwinsville, Cortland and other localities noted in the last Bulletin. Computations of population of cities, made by the late secretary, shows the present estimate of many of them as too high.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
Sou. Tier Dist. (*Con.*):																												
Bath	7,400	5	8.10	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	1	1	0	0	1	1
Olean	*8,000	7	10.50	1	14.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	2	0	0	2	0	1	2	0
JAMESTOWN	*12,000	15	15.00	5	33.3	0	0	0	0	0	0	0	0	0	0	2	111.11	3	1	0	2	1	1	2	1	1	1	0
Westfield	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Rest of district	....	52	....	6	11.5	0	0	0	0	0	1	0	1	0	0	1	....	4	8	0	5	0	5	7	3	3	9	5
East Central Dist.:																												
Walton	3,511	3	10.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	1	0	0	0	0	1	0
Franklin	3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	2	0
Cooperstown	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	0
Liberty	3,209	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	2
Oneonta	*5,000	6	14.40	3	50.0	0	0	0	0	0	0	0	0	0	0	0	....	5	0	0	0	0	0	0	0	0	0	1
Worcester	*3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	1	1	0	0	0	1
SYRACUSE	65,000	105	19.38	28	26.6	1	0	2	0	0	0	0	2	0	1	0	57.14	20	20	1	9	3	11	17	3	4	5	6
Cortland	7,361	6	11.80	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	2	0	2	0
Homer	3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	2	1
Rest of district	....	105	....	10	9.0	0	0	5	0	0	0	0	0	1	1	1	76.20	7	8	5	7	6	11	14	6	6	19	8
West Central Dist.:																												
AUBURN	*26,000	35	16.15	9	24.8	3	0	0	1	0	0	0	0	0	1	0	57.14	5	8	0	0	4	3	4	0	1	1	4
Groton	3,450	2	7.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	0	0	0	0	0	0
Ithaca	*10,000	11	13.20	1	9.1	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	1	2	3	1	0	2	1
Waterloo	*4,500	5	13.33	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	1	0	0	0	0	1	0	0	2	0
Hector	5,000	6	14.40	1	16.7	0	0	2	0	0	0	0	1	0	0	0	500.00	0	0	0	0	1	0	0	0	1	1	0
Seneca Falls	*6,853	15	26.65	0	......	0	0	0	1	0	0	0	0	0	0	0	66.67	0	1	0	2	1	2	1	0	2	2	0
Manchester	*4,000	3	9.00	1	33.3	1	0	0	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	1	0	0	1	0
Phelps	*7,000	5	8.57	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	1	1	1	0	0	0	0	0	0
Canandaigua	6,300	3	6.00	1	33.3	0	0	0	0	0	0	0	0	0	0	2	666.66	0	0	0	0	0	0	1	0	0	0	0
Geneva	*6,000	9	18.00	1	11.1	0	0	0	0	0	0	0	0	0	0	0	....	0	3	1	2	0	0	0	1	2	0	0
Attica	3,100	2	7.75	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	1	0	0
Penn Yan	4,500	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	1	1
Rest of district	....	77	....	5	6.5	0	0	0	0	0	1	0	0	0	0	0	13.00	2	18	1	4	5	6	16	6	6	10	9

Coxsackie	4,000	5	15.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	2	1	0	0	0	1
Catskill	*4,500	6	16.00	3	50.0	0	0	0	0	0	0	0	0	1	0	0	166.67	1	1	0	0	1	1	0	0	0	0	1
HUDSON	*10,000	23	27.60	6	26.1	0	0	0	0	0	0	0	0	2	0	0	86.95	2	8	0	2	1	2	6	0	4	0	1
KINGSTON	20,000	27	16.20	15	55.5	1	0	0	0	0	0	0	0	1	1	2	148.15	1	2	2	6	1	4	3	1	2	0	0
Rosendale	5,000	5	12.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	0	1	0	0	0	0	0
Marbletown	4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	0	0
Esopus	4,736	9	22.75	4	44.5	0	0	0	0	0	0	0	0	0	1	1	222.22	1	0	0	0	0	0	0	1	1	2	2
Saugerties	*4,000	6	18.00	1	......	0	0	0	0	0	0	0	0	0	1	0	166.67	1	2	0	0	0	1	0	0	0	1	0
POUGHKEEPSIE	20,200	24	14.25	8	83.3	1	0	1	0	0	0	0	0	1	1	0	166.67	4	4	0	1	1	8	2	0	1	8	1
Fishkill	10,732	19	21.25	2	11.1	0	0	0	1	0	0	0	0	0	0	1	111.11	1	7	0	1	2	0	0	0	0	8	8
Wappinger Falls	*5,000	6	14.40	1	16.7	0	0	0	1	0	0	0	0	1	0	0	333.33	0	1	0	0	0	0	1	0	1	0	1
NEWBURGH	*20,000	35	21.00	12	31.8	0	0	1	0	0	0	0	0	0	1	1	85.71	1	5	0	2	2	6	11	0	0	1	4
Port Jervis	*9,000	6	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	1	0	1	0	1	0
Middletown	*10,000	8	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	4	0	0	0	1	3	0	0	0	0
Goshen	4,387	4	11.75	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	1	0	2	0
Haverstraw	*7,000	4	6.86	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	0	2
Nyack	....	7	....	4	57.1	0	0	0	0	0	0	0	0	0	4	0	571.43	1	0	0	0	0	0	1	0	0	1	0
Ramapo	5,000	11	26.40	2	18.2	0	0	0	0	0	0	0	0	1	0	0	91.91	2	0	0	0	0	0	2	3	1	1	1
Rest of district	....	146	....	30	20.5	1	0	3	1	0	1	0	0	1	7	1	102.75	15	15	1	6	5	20	15	4	9	25	16
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	8,700	4	13.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	2	0
Greenwich	8,861	6	18.65	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	3	0	0	0	0	1
Salem	8,500	8	10.29	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	1	0
Fort Ann	4,267	4	11.16	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	1	0	0	0	0	0	0	2	0
Fort Edward	4,880	4	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	3	0	1	0
Queensbury	10,000	14	16.80	4	28.6	0	0	0	0	0	3	0	0	0	0	0	214.28	2	0	0	2	0	3	3	0	1	0	0
Crown Point	4,257	1	2.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	0
Port Henry	2,525	4	19.10	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	2	0	1
Malone	7,908	8	12.15	3	37.5	0	0	0	0	0	0	0	0	1	3	0	500.00	0	1	0	0	0	0	2	0	0	0	1
OGDENSBURG	11,000	9	9.82	0	......	0	0	0	0	0	0	0	0	0	1	0	111.11	1	8	0	1	0	0	1	0	0	1	1
Ellisburgh	4,812	5	12.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	1	0	2	0	0	0	1
Plattsburgh	7,000	8	13.71	2	25.0	1	0	0	0	0	0	0	0	0	0	0	125.00	0	8	0	0	0	1	2	0	0	1	0
WATERTOWN	12,209	22	21.64	9	40.9	0	0	0	0	0	0	0	0	1	5	0	272.73	1	0	0	4	2	1	2	2	1	0	8
Cape Vincent	8,143	2	7.63	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	1	0	0	0
Clayton	4,214	5	14.30	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	1	0	1	0	0	0	0	0
Rest of district	....	100	....	24	24.0	0	0	0	0	0	0	2	1	8	6	2	150.00	4	16	2	10	7	12	12	7	2	8	6
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	24	19.20	7	29.2	0	0	0	0	0	1	0	0	0	0	2	125.00	2	6	0	1	2	8	1	0	2	2	2
Schoharie	3,850	4	14.32	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	2	1	0
Middleburgh	3,376	3	10.66	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	1	0	0	0	0	0
AMSTERDAM	14,000	19	15.57	6	31.6	1	0	0	0	0	0	0	0	0	2	0	....	3	1	0	0	1	2	7	0	0	1	1
Johnstown	*6,000	8	16.00	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	1	3	0	0	0	2	0	1	1	0	0
Gloversville	*8,000	8	12.00	2	25.0	0	0	0	0	0	0	0	0	1	0	1	250.00	0	2	0	0	0	0	2	0	0	1	1
Little Falls	7,800	12	19.72	5	41.6	1	0	0	0	0	0	0	0	0	0	2	250.00	1	2	1	1	0	1	3	0	0	0	0
Ilion	4,200	1	2.83	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
UTICA	*39,000	68	20.92	14	20.6	5	0	0	0	0	0	0	0	0	1	0	29.41	11	14	0	7	2	3	12	5	2	2	3
ROME	12,045	9	9.00	2	22.2	0	0	0	0	0	0	0	0	1	0	0	111.11	1	1	0	2	0	0	2	1	1	0	0
Boonville	4,000	6	18.00	3	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	0	2	1	0	0	0
Camden	3,400	6	21.18	0	......	1	0	0	0	0	0	0	0	0	0	0	166.67	1	0	0	0	0	0	0	0	0	3	1
Waterford	4,326	9	22.20	2	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	5	0	0	0	1	1
Ballston Spa	3,300	4	14.54	3	75.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	1	1	0	0	0	0	0	0
Saratoga Springs	10,000	12	14.40	2	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	1	1	1	1	3	2
Rest of district	....	83	....	12	14.5	0	0	1	0	0	0	0	1	1	0	1	48.20	6	9	2	7	8	9	5	5	7	20	6

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*20,000	30	18.00	5	16.7	0	0	0	2	0	0	1	0	0	3	0	200.00	0	2	0	2	2	4	0	1	2	0	11
Candor	4,323	5	13.93	1	20.0	0	0	0	0	0	0	0	0	0	2	0	400.00	0	0	0	1	0	0	0	0	0	2	0
ELMIRA	*25,000	19	8.72	2	11.1	0	0	1	0	0	0	0	0	0	1	0	111.11	3	2	0	3	1	4	3	0	1	0	0
Horseheads	8,500	6	20.57	1	16.6	0	0	1	0	0	0	0	0	0	0	0	166.67	0	1	0	0	0	1	0	1	0	1	1
Bath	7,400	1	....	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	1	0	0	0
Olean	*8,000	14	21.00	3	21.4	0	0	0	0	0	1	0	0	0	1	0	107.14	0	2	0	1	0	0	3	0	0	4	2
JAMESTOWN	*12,000	10	10.00	3	30.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	3	2	2	0	0	1	0	1
Westfield	3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	2
Fredonia	2,800	2	8.57	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	1
Rest of District	....	47	....	6	12.8	0	0	1	1	0	1	0	0	0	0	2	106.38	0	4	1	4	1	1	11	2	2	14	2
EAST CENTRAL DIST.																												
Franklin	3,000	1	4.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
Cooperstown	*3,000	1	4.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Otsego	4,700	2	5.10	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	0	0
Oneonta	*5,000	9	21.60	2	22.2	0	0	0	0	0	0	0	1	0	3	0	444.44	1	2	0	0	0	0	0	1	0	0	1
Worcester	*3,000	1	4.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	0	0
Brookfield	3,685	5	16.25	0	....	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	2	0	0	0
Canastota	2,500	2	9.60	0	....	1	0	0	0	0	0	0	0	0	0	0	500.00	0	1	0	0	0	0	0	0	0	0	0
Hamilton	3,912	3	9.23	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	2	0	0	0
Baldwinsville	3,000	1	4.00	1	10 0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	0	0	0
SYRACUSE	65,000	72	13.30	18	25.0	1	0	1	1	0	0	1	0	0	2	0	83.70	5	11	1	10	4	9	10	2	4	4	6
Geddes	7,000	10	17.14	4	40.0	0	0	0	0	0	0	0	0	0	0	0	....	2	1	1	1	1	1	2	0	0	0	1
Homer	3,000	10	40.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	2	2	0	2	1
Rest of District	....	106	....	15	14.1	2	0	2	1	0	0	0	1	0	1	1	75.47	5	9	3	7	5	17	18	2	6	17	9
WEST CENTRAL DIST																												
AUBURN	*26,000	23	10.62	3	13.0	1	0	0	1	0	0	0	1	0	1	0	173.91	2	3	0	2	2	0	3	1	1	1	4
Ithaca	*10,000	9	10.80	1	11.1	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	2	3	1	0	0	3	1
Waterloo	*4,500	4	10.67	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	1	1	0	0	0	0	0
Hector	5,000	2	4.40	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	0
Seneca Falls	*6,853	1	2.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Phelps	*7,000	7	12.00	0	....	0	0	0	0	0	0	0	0	0	2	0	280.85	3	0	0	0	0	1	0	0	0	1	0
Canandaigua	6,300	6	11.43	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	3	1	1	0	0	0
Geneva	*6,000	3	6.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	2

Lima...	*2,800	5	21.40	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	0	0	2	0	0	1	1
Rest of District....	....	56	....	7	12.5	0	0	0	0	0	0	0	0	0	0	2	35.71	5	9	1	2	4	5	13	2	3	5	5
LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	23	11.50	5	13.0	0	0	0	0	0	0	0	0	0	0	1	43.50	4	8	0	1	3	2	1	0	0	2	1
Fulton	*4,000	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	1	0	0	0	0	0	0	0
Clyde	*3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	1	0	1	0	0
Lyons	*6,000	8	16.00	1	12.5	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	0	0	2	2	1
Newark	3,500	5	17.15	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	0	1	0	0	0	1	2	0	0	0	0
Oneida	5,200	3	6.35	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	0	0	0	0	1
Palmyra	*4,800	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	1	0	0
Wolcott	3,753	5	16.00	0	......	0	0	0	1	0	0	0	0	0	0	0	200 00	0	2	0	0	0	0	1	0	0	0	1
ROCHESTER	*101,000	132	15.68	40	30.3	0	0	2	1	0	3	0	0	2	6	3	128 33	15	23	0	3	5	12	27	6	5	10	9
Brockport	4,500	4	10.67	1	25 0	0	0	0	0	0	0	0	0	0	1	0	250.00	1	0	0	0	0	0	0	0	1	1	0
Greece	*5,000	4	9.60	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	2	0	0	0	1
Mendon	3,200	3	11.25	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	2	0
Brighton	3,736	7	22.50	3	42.8	0	0	0	0	0	0	0	0	1	0	0	142.87	0	1	0	1	0	1	0	0	1	0	2
Albion	5,000	3	7.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	1	0	0	0	0	0	0
BUFFALO	*202,818	†230	14.80	85	37.0	2	0	1	0	0	1	3	1	0	6	7	91.30	20	44	1	7	1	21	40	5	12	11	47
Tonawanda	4,900	2	4.90	2	10.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	1	0	0
Rest of District	....	81	....	13	16.0	1	0	0	0	0	1	0	0	1	1	2	75.00	3	11	1	2	1	8	15	8	1	12	13
Totals for the State	....	6,316	....	2,223	35.5	57	1	39	50	2	74	56	24	72	390	465	193.65	626	911	74	382	323	470	714	189	298	397	702

† For four weeks ending June 26.

REMARKS — The reported mortality for the month of June is 6,306; of which 35.3 per cent were under the age of five years. From Zymotic diseases there were 1,220 deaths, a ratio per 1,000 total mortality of 193.65. The ratio per 1,000 of deaths from Typhoid fever is 6.20; from Diarrhœal diseases, 73.80; from Croup and Diphtheria, 60.32. Temporary outbreaks of the latter disease appear at various localities. Whooping cough has been prevalent through the month at North Hempstead, the total mortality for the month being about the same as in May. Scarlet fever is reported as prevalent in Hudson. Almost total abatement of Malarial diseases is reported from Westfield, Richmond county. No spread of Small-pox in Gravesend has occurred and none is reported elsewhere save in New York city. From Consumption the ratio of mortality is 144.60 per 1,000 deaths from all causes; and 223.88 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases, is 333.65. From Acute Respiratory diseases there were 93.36 deaths per 1,000. There have been 160 delayed returns received for the month of May, notably from Baldwinsville, Brookfield, Canastota, Cobleskill and Owego.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during July, 1886.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,439,000	4,198	34.85	2,499	59.5	20	0	22	19	0	25	58	4	60	193	1382	420.48	261	489	28	281	186	150	321	62	134	199	857
BROOKLYN	*690,000	1,711	29.50	1,075	62.8	0	0	4	17	0	10	7	2	23	73	586	431.90	108	156	9	124	53	65	183	13	43	19	214
Gravesend	*5,000	†24	57.60	20	83.4	0	0	0	0	0	0	0	0	0	0	14	583.34	0	0	0	2	1	0	5	0	1	0	1
New Lots	*20,000	47	27.98	29	57.6	0	0	1	1	0	0	0	0	0	1	16	404.04	5	4	0	2	3	4	8	0	0	2	0
Flatlands	8,127	5	19.30	2	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	1	1	1	0	0	0	0	1	0	0
New Utrecht	4,742	19	45.90	9	47.3	0	0	0	0	0	0	0	0	0	0	6	815.78	2	1	0	2	0	0	1	0	5	0	2
LONG ISLAND CITY	*21,000	81	46.20	46	56.8	0	0	0	2	0	5	2	0	0	3	29	506.17	4	9	0	3	1	2	7	1	6	0	7
Newtown	*10,000	16	19.20	10	62.5	0	0	0	1	0	1	0	0	2	1	5	625.00	0	1	0	0	0	0	0	0	0	1	4
Oyster Bay	*12,000	14	14.00	6	42.8	0	0	0	0	0	0	0	0	0	0	8	214.26	0	3	0	2	0	1	2	0	1	0	2
Hempstead	18,160	21	14.00	10	47.6	0	0	0	0	0	0	0	0	0	0	7	333.33	0	0	0	3	1	1	3	1	0	2	8
North Hempstead	*7,000	8	13.71	8	87.5	0	0	0	0	0	0	0	0	1	0	3	500.00	0	0	0	0	0	0	2	0	0	2	0
Huntington	8,098	11	16.30	2	18.2	0	0	0	0	0	0	0	0	0	0	2	181.82	0	1	0	0	1	0	1	2	0	3	1
Babylon	4,739	1	4.00	1	100.0	0	0	0	0	0	0	0	0	0	0	1	1000.00	0	0	0	0	0	0	0	0	0	0	0
Southold	7,267	12	19.80	1	10.0	0	0	0	0	0	1	0	0	0	0	1	166.67	0	2	0	0	0	0	2	0	1	3	2
Sag Harbor	*3,000	7	28.00	3	42.8	0	0	0	0	0	0	0	0	0	0	2	286.00	0	1	0	0	0	0	3	0	0	1	0
Edgewater	*10,000	28	33.60	14	50.0	0	0	0	0	0	0	0	0	0	0	7	250.00	0	6	0	1	1	0	8	0	2	1	7
Westfield	*7,000	12	20.57	5	41.7	0	0	0	0	0	0	0	0	0	0	3	240.00	0	0	0	1	1	3	2	0	0	0	2
YONKERS	*25,000	56	26.88	34	60.7	0	0	0	0	0	0	1	0	0	0	25	264.29	8	3	0	2	2	6	5	0	4	1	4
Westchester	*6,900	8	12.46	6	75.0	0	0	0	0	0	0	0	0	0	0	3	375.00	2	0	0	0	0	0	1	0	2	0	0
Mount Vernon	*5,000	11	26.40	7	63.6	0	0	1	0	0	0	0	0	0	0	5	545.45	1	1	0	0	0	0	1	0	0	2	0
Sing Sing	*6,500	8	14.77	1	12.5	0	0	2	0	0	0	0	0	0	0	0	250.00	1	1	0	0	2	0	2	0	0	0	0
New Rochelle	5,276	18	40.75	10	55.5	0	0	0	1	0	0	0	0	0	4	3	444.41	1	0	0	0	2	0	2	0	2	0	8
Rest of district	....	116	....	50	43.1	2	0	1	8	0	0	0	0	2	5	30	870.68	4	9	0	5	6	6	14	0	8	9	12
HUDSON VALLEY DIST:																												
ALBANY	*96,000	227	28.38	97	42.7	0	0	9	1	0	1	1	0	8	4	43	281.94	15	25	2	10	9	20	18	6	6	8	26
COHOES	22,500	50	26.67	27	51.0	0	0	2	0	0	0	0	0	0	2	17	420.00	3	6	0	3	1	1	4	1	1	8	7
West Troy	13,000	39	36.00	22	56.2	0	0	0	0	0	0	5	0	0	4	12	435.90	5	0	0	2	4	3	4	0	3	0	0
Hoosick Falls	*1,000	7	21.00	2	28.6	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	1	2	0	1	1
TROY	*65,000	151	27.88	83	55.0	5	0	0	0	0	0	5	0	0	10	46	437.08	14	11	1	13	0	10	13	2	8	6	8
Lansingburgh	[illegible]	35	40.82	18	51.5	0	0	0	0	0	0	0	0	0	0	11	553.58	1	4	0	5	1	5	4	0	1	0	1
Green Island	*5,000	15	36.00	12	80.0	0	0	0	0	0	0	0	0	0	0	7	466.67	1	2	0	0	1	0	1	0	2	0	1
Greenbush	[illegible]	10	16.67	8	80.0	0	0	1	0	0	0	0	0	0	0	3	400.00	0	1	0	2	0	0	3	1	0	0	0

Coxsackie	4,000	7	21.00	5	72.9	0	0	0	0	0	0	0	0	2	0	0	285.71	0	0	0	1	0	1	0	1	1	0	1
Catskill	*4,6.0	10	26.60	5	50.0	0	0	0	0	0	0	0	0	3	0	2	500.00	0	1	0	0	0	0	2	0	1	1	0
HUDSON	*10,000	11	13.20	2	19.1	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	1	2	4	1	0	1	0
KINGSTON	*21,100	19	10.80	9	47.3	0	0	0	0	0	0	0	0	1	1	2	210.52	2	4	0	2	1	2	1	1	1	1	0
Rosendale	5,000	4	9.60	2	50.0	0	0	0	0	0	0	0	0	0	0	1	....	1	0	0	0	0	0	0	0	0	1	2
Marbletown	4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	0
Esopus	4,786	8	8.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	2	0
Saugerties	*4,000	6	18.00	3	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	1	0	2	0	2
POUGHKEEPSIE	20,200	34	20.20	17	50.0	0	0	0	0	0	0	0	0	1		5	205.88	2	2	1	1	0	3	9	2	2	2	8
Fishkill	10,732	15	16.77	7	46.7	0	0	0	0	0	0	0	0	0		6	400.00	0	4		0	1	0	0	0	3	0	1
Wappinger Falls	*6,000	12	21.00	5	41.7	0	0	0	1	0	0	0	0	0	1	1	125.00	0	3		3	1	2	0	0	2	0	1
NEWBURGH	*20,000	40	24.00	5	37.5	0	0	0	0	0	0	0	0	0	1	4	125.00	0	0	1	4	2	4	10	3	4	1	3
Port Jervis	*9,000	12	16.00	1	8.3	0	0	4	0	0	0	0	0	0	0	0	83.33	0	4	0	2	2	0	0	0		0	1
Middletown	*10,000	17	20.40	5	29.4	0	0	0	0	0	0	0	0	0	0	4	235.30	0		0	3	0	2	2	0		1	0
Goshen	4,387	9	24.62	1	11.1	0	0	0	0	0	0	0	0	0	0	1	111.11	0		0	0	0	1	1	0	0	1	1
Haverstraw	*7,000	20	34.28	13	65.0	0	0	0	0	0	0	0	0	0	0	9	450.00	0	0	0	0	0	1	2	0	1	3	4
Nyack	*5,000	6	14.20	3	50.0	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	1	0	0	2	0	0	0	0	2
Ramapo	5,000	7	16.80	5	71.4	0	0	0	0	0	0	0	0	0	0	3	428.57	1	1	0	0	0	0	1	0	0	0	1
Rest of district	....	204	....	53	26.0		0	3	0	0	0	1		4	10	25	220.00		25		18	12	15	23	7	20	13	19
ADIRONDACK & NORTHERN DISTRICT:																												
Salem	8,500	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Greenwich	3,861	2	6.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1		0	0	0	0	0	0
Cambridge	1,500	3	24.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0		0	1	0	0	1	1
Fort Ann	4,267	2	5.56	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0		0	1	0	0	0	0
Fort Edward	4,880	6	15.00	1	16.7	0	0	0	0	0	0	0	0	0	0	1	166.67	0	3	0			1	0	0	0	0	1
Queensbury	10,000	29	34.80	14	48.3	0	0	2	0	0	0	0	0	0	0	12	422.75	0	5	0			2	3	1	1	1	0
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0	0	1	0	0	0	0	500.00	0	0	0	0		0	1	0	0	0	0
Port Henry	2,525	5	23.60	2	40.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1		1	0	0		0	2
Malone	7,900	13	19.75	8	61.5	0	0	0	0	0	0	0	0	0	0	2	153.80	1	0	0	0		3	0	0		0	6
OGDENSBURG	11,000	20	21.82	10	50.0	0	0	0	0	0	0	0	0	0	1	8	450.00	0	4	0	0		2	1	0		1	2
Gouverneur	5,500	6	13.10	1	16.7	1	0	0	0	0	0	0	0	1	1	0	500.00	0	0	1	0		0	0	0		1	0
Ellisburgh	4,812	9	22.50	3	33.3	0	0	0	0	0	0	0	0	0	0	0	900.00	0	0	0	2		1	3	0		1	0
Cape Vincent	3,143	3	11.25	1	33.3	0	0	0	0	0		0	0	0	0	0	....	0	0	0	1		0	0	0		0	0
Rest of district	....	100	....	22	22.2	1	0	1	0	0		3	0	3	3	5	160.00	3	11				9	10	3		16	10
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	42	33.60	22	52.3	0	0	2	1	0	1	0	0	0	3	3	238.10	5	2	0		3	2		0	1	6	7
Schoharie	3,350	6	21.50	3	50.0	0	0	0	0	0	0	0	0	0	4	0	666.66	1	1	0		0	0		0	0	0	1
Middleburgh	3,376	3	10.70	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0		0	1		0	0	0	0
AMSTERDAM	*14,000	24	20.57	12	50.0	0	0	0	0	0	0	0	0	0	1	5	250.00	2	3	0		0	2		2	0	1	1
Johnstown	*6,000	8	16.00	5	62.5	0	0	0	0	0	0	0	0	0	0	0	....	5		0		0	0		0	0	1	0
Gloversville	*10,000	13	15.60	4	30.7	0	0	0	0	0	0	0	0	0	2	4	307.70	1		0	1	0	0		2	0	0	2
Little Falls	7,300	11	18.10	2	18.2	0	0	0	0	0	0	0	0	0	2	0	181.81	1	2	0	1	0	0		0	3	1	1
Ilion	4,200	5	14.30	3	60.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1			0	1	0	2
Herkimer	*3,000	5	20.00	2	40.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	0	0	0	0			1	1	0	0
UTICA	*39,000	75	23.10	32	42.6	0	0	0	1	0	0	0	0	0	4	16	280.00	6	8	0	2	5		13	3	0	2	9
ROME	12,045	21	21.00	4	19.0	0	0	0	0	0	0	0	0	0	0	1	47.62	1	3	0	3	0	3	1	2	0	3	4
Whitestown	4,500	6	16.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	1	0	2	0	0	2	0
Camden	3,400	4	14.12	0	......		0	0	0	0	0	0	0	0	0	0	....	1	0	0	2	0	0	0	0	0	1	0
Waterford	4,326	16	44.38	5	31.2		0	0	0	0	0	0	0	0	1	4	312.50	0	2	0	3	2	0	3	0	0	1	0
Ballston Spa	3,300	10	36.26	5	50.0			1	0	0	0	0	0	0	0	5	600.00	2	1	0		0	0		0	0	0	0
Saratoga Springs	10,000	18	21.60	4	22.2			0	0	0	0	0	0	0	0	2	111.11	0	6	0		0	1		0		2	0
Rest of district	....	77	....	25	32.5			2	0	0	0	0	0	0	1	10	168.87	5	8	0			6		2		14	13

† Additional transient population of 5,000.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
BINGHAMTON	*23,000	31	18.60	12	38.7	0	0	0	2	0	0	0	0	0	2	8	387.10	2	2	0	4	1	6	0	1	1		1
Owego	6,000	1	2.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	0
Candor	4,323	2	5.55	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	2	0
Waverly	3,000	7	28.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	2	0	1	0	0	0	0	0	2	2
ELMIRA	*25,000	35	16.80	16	45.7	0	0	1	0	0	0	0	0	0	0	10	314.28	0	2	3	2	2	1	5	5	4	0	0
Horseheads	3,500	8	10.29	2	25.0	0	0	0	0	0	0	0	0	0	0	0	125.00	0	0	0	4	0	0	0	1	2	0	0
Bath	7,400	7	11.35	1	14.3	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	0	2	3	0	0	2
Olean	*8,000	9	13.50	4	41.5	0	0	0	0	0	1	0	0	0	0	4	555.55	0	1	1	2	0	0	0	0	0	0	0
JAMESTOWN	*12,000	20	20.90	9	45.0	0	0	0	0	0	0	0	0	0	1	5	300.00	1	5	0	0	0	2	4	1	0	0	1
Rest of district	......	44	......	8	18.2	0	0	1	3	0	0	0	0	0	4	3	250.00	2	5	1	2	2	3	4	3	1	8	2
EAST CENTRAL DIST.:																												
Walton	3,541	4	13.56	1	25.0	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	2	0	0	1	0	0	1	0
Delhi	3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	0	0
Franklin	3,000	7	28.00	2	28.6	0	0	2	0	0	0	0	0	0	0	0	285.60	1	1	0	0	0	0	0	0	1	2	0
Cooperstown	*3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	1	0	0	0	0	0
Oneonta	*5,000	8	19.20	5	62.5	1	0	1	0	0	0	0	0	0	3	0	625.00	0	1	0	1	0	0	1	0	0	0	0
Oneida	5,000	2	5.00	2	100.0	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	0	0	0	0	0	1
Canastota	2,500	5	24.00	1	20.0	0	0	0	0	0	0	0	0	1	3	0	800.00	0	0	0	1	0	0	0	0	0	0	0
SYRACUSE	*70,000	89	15.26	36	40.5	4	0	1	1	0	0	0	1	0	2	21	337.10	3	10	0	8	4	6	7	4	8	4	5
Geddes	7,000	8	13.86	2	25.0	0	0	0	0	0	0	0	0	0	0	1	125.00	0	1	0	0	0	0	1	1	0	1	3
Cortland	7,361	2	3.26	1	50.0	0	0	0	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	1	0	0	0	0
Homer	3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	1	1
Rest of district	......	94	......	15	16.0	0	0	2	1	0	0	0	1	2	2	6	148.90	7	8	1	8	4	8	12	3	3	10	7
WEST CENTRAL DIST.:																												
AUBURN	*26,000	46	21.23	20	43.5	1	0	0	1	0	0	0	0	1	0	12	326.10	1	6	1	1	3	4	7	2	1	1	4
Ithaca	*10,000	8	9.60	2	25.0	0	0	0	0	0	0	0	0	0	0	2	......	0	2	0	1	0	1	0	0	0	1	1
Waterloo	*4,500	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	2	0	0	0	0
Hector	*5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	1	2	1
Seneca Falls	*6,853	12	21.00	2	16.7	0	0	0	0	0	0	0	0	0	0	2	......	0	3	0	2	0	0	2	[illegible]	1	0	1
Manchester	*4,000	2	6.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	1	0	0	0	[illegible]	0	0	1
Phelps	*7,000	2	3.43	0	......	0	0	0	0	0	0	0	0	0	[illegible]	0	500.00	0	0	0	0	0	0	0	[illegible]	0	0	1
Canandaigua	6,300	8	15.21	2	[illegible]	0	0	0	0	0	0	0	0	0	[illegible]	0	125.00	0	0	0	0	0	[illegible]	4	[illegible]	0	2	0
Geneva	*6,000	14	28.00	2	14.3	0	0	0	0	0	0	0	0	0	[illegible]	0	......	0	4	0	0	0	[illegible]	5	[illegible]	1	2	8

Penn Yan	4,500	4	10.67	0	......	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	1	0	0	1	0	0	1	0
Rest of district	....	90	....	23	25.5	0	0	2	0	0	0	0	0	1	0	8	121.20	3	11	0	10	2	6	5	5	4	23	10
LAKE ONTARIO AND WESTERN DISTRICT																												
OSWEGO	*24,000	25	12.50	9	36.0	0	0	1	0	0	0	0	0	0	0	0	40.00	2	3	0	0	0	3	4	0	3	2	6
Richland	4,000	3	9.00	1	33.3	0	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	1	1
Fulton	*4,000	4	12.00	2	50.0	0	0	1	0	0	0	0	0	0	0	1	500.00	0	0	0	0	0	0	0	0	0	0	2
Clyde	*3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	2	1	0	2	0	0	0	0
Lyons	*6,000	5	10.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	1	1	0	0	0	0	0	0	0	2	0
Newark	3,500	4	13.71	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	1	1	0	0
Palmyra	*4,800	6	15.00	0	......	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	1	0	0	1	0	0	2	0
ROCHESTER	*120,000	178	17.80	76	42.7	0	0	1	2	0	0	0	0	0	10	29	285.95	11	21	0	11	5	6	35	4	18	8	17
Brockport	4,500	5	13.34	2	40.0	0	0	0	0	0	0	0	0	0	0	2	400.00	0	0	0	0	0	0	1	0	0	2	0
Mendon	3,200	2	7.50	1	50.0	0	0	0	0	0	0	0	0	1	0	0	500.00	0	0	0	0	0	0	0	0	0	0	1
Brighton	3,736	‡3	9.80	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	0	1	0	0	0	0	0	0	1	0	0
Albion	*5,000	4	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	2	1
LOCKPORT	15,000	22	17.60	8	36.3	1	0	0	1	0	0	0	0	0	0	3	227.27	1	3	0	3	2	2	1	0	2	1	2
BUFFALO	*202,818	§467	23.45	267	57.2	8	0	3	1	0	4	0	0	0	11	152	333.28	24	37	0	28	12	20	58	3	16	17	78
Tonawanda	4,900	10	24.49	6	60.0	0	0	0	0	0	0	0	0	0	2	3	500.00	0	0	0	0	0	0	1	1	1	0	2
Amherst	4,518	9	24.00	2	22.2	0	0	0	1	0	0	3	0	0	0	1	222.22	0	3	0	1	0	1	0	0	0	0	2
Hamburg	3,235	4	14.84	2	50.0	0	0	0	0	0	0	0	0	0	2	0	500.00	0	1	0	0	0	0	0	0	0	1	0
Rest of district	....	91	....	15	16.5	0	0	2	0	0	0	0	1	0	5	2	111.10	1	7	1	2	1	9	7	5	9	22	17
Totals for the State	....	9,376	....	5,021	53.5	44	0	75	61	0	49	80	10	114	384	2606	374.63	541	949	56	646	537	449	907	166	373	480	989

‡ Besides nine in public institutions.

§ For five weeks ending July 31.

REMARKS.—The tota reported mortality for July is 9,376, of which 50.3 per cent were under the age of five years. From Zymotic diseases there were 3,515 deaths, a ratio of about 375.00 per 1,000 total mortality. From Diarrhœal diseases, which largely predominate over all other causes of death, the ratio per 1,000 is 287.56; or considerably more than one-fourth; they constitute more than three-fourths of the deaths from Zymotic diseases. In July, 1885, the mortality, being largely in excess of any other month in the year, was about the same as that of this month; the ratio then of deaths from Diarrhœal diseases was 320.00 per 1,000. and to Zymotic diseases about 75 per cent. From Typhoid fever the ratio per 1,000 total mortality is 8.00; from Croup and Diphtheria, 40.95. From Consumption the ratio of mortality is 101.22 per 1,000, and 217.91 per 1,000 above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases is 482.08. From Acute Respiratory diseases there were 57.68 deaths per 1,000. There have been received 240 delayed returns for June; 36 were from Cohoes, 3 from Bath, 7 from Seneca Falls, 8 from Haverstraw, 17 from Jamaica, 4 from Amherst and 18 from Newtown, all of which places, usually reported in the Bulletin, failed in whole or in part to send returns in time for the last issue.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during August, 1886.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.
MARITIME DISTRICT:														
NEW YORK CITY	*1,439,000	3,247	26.50	1,567	48.6	16	1	37	33	0	15	36	4	48
BROOKLYN	*600,000	1,471	25.10	749	50.9	0	0	13	10	0	16	4	2	36
Gravesend	*5,000	8	19.20	4	50.0	0	0	0	0	0	0	0	0	0
Flatlands	3,127	5	19.00	3	60.0	0	0	0	0	0	0	0	0	0
New Utrecht	4,742	9	22.72	4	41.4	0	0	0	0	0	4	0	0	0
LONG ISLAND CITY	*20,000	43	25.80	24	55.8	0	0	0	1	0	0	0	0	0
Newtown	*10,000	32	38.40	16	50.0	0	0	0	0	0	0	0	0	2
Oyster Bay	*12,000	18	18.00	7	38.9	0	0	0	0	0	0	0	0	1
Hempstead	18,160	17	11.33	6	35.0	0	0	0	0	0	0	0	0	0
North Hempstead	*7,000	18	30.85	4	22.2	0	0	0	0	0	0	0	0	0
Huntington	8,098	9	12.10	5	55.5	0	0	0	0	0	0	0	0	0
Southold	7,267	5	8.25	1	20.0	0	0	0	0	0	0	0	0	0
Sag Harbor	*3,000	6	24.00	2	33.3	0	0	0	0	0	0	0	0	0
Edgewater	*10,000	22	26.40	11	50.0	2	0	0	0	0	0	0	0	0
Northfield	7,014	12	20.37	4	25.0	0	0	1	0	0	0	0	0	0
Westfield	*7,000	20	34.28	10	50.0	1	0	0	0	0	0	0	0	0
YONKERS	*25,000	59	28.32	32	54.2	1	0	1	2	0	0	0	0	0
Westchester	*6,900	11	19.13	3	25.4	0	0	2	0	0	0	0	0	0
Mount Vernon	*5,000	15	36.00	8	47.0	0	0	0	0	0	0	0	0	1
Sing Sing	*6,500	13	24.00	6	46.1	0	0	0	0	0	0	0	0	1
New Rochelle	5,276	14	31.70	8	57.1	0	0	0	0	0	0	0	0	0
Rest of district	....	98	....	40	40.8	0	[illegible]	1	1	0	0	0	0	6
HUDSON VALLEY DIST:														
ALBANY	96,000	213	26.58	99	46.5	2	0	8	0	0	0	1	0	20
West Troy	13,000	27	24.92	16	60.0	0	0	2	0	0	0	0	0	0
Hoosick Falls	*4,000	13	30.00	8	61.5	1	0	0	0	0	0	0	0	1
TROY	*60,000	159	31.80	79	49.4	9	0	4	1	0	0	1	0	0
Lansingburgh	*9,700	18	22.78	4	22.2	0	0	0	0	0	0	0	0	0
Green Island	*5,000	7	16.80	5	71.4	0	0	0	0	0	0	0	2	0
Greenbush	*7,200	19	31.67	7	36.8	1	0	1	0	0	0	0	0	0
Coxsackie	4,000	10	30.00	3	30.0	0	0	1	0	0	0	0	0	1
Catskill	*4,000	5	15.00	2	40.0	0	0	0	0	0	0	0	0	0

	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:														
NEW YORK CITY	153	695	319.70	236	443	30	222	191	111	262	68	117	186	343
BROOKLYN	80	316	321.07	116	171	13	92	62	64	147	20	42	29	258
Gravesend	0	4	500.00	1	1	0	0	0	2	0	0	0	0	0
Flatlands	0	3	600.00	0	1	0	0	0	0	1	0	0	0	2
New Utrecht	0	2	222.22	0	1	0	0	0	0	1	0	2	1	3
LONG ISLAND CITY	1	9	325.80	1	4	0	2	4	3	5	0	4	2	4
Newtown	0	10	406.25	2	2	0	2	2	1	2	0	2	3	3
Oyster Bay	0	5	333.33	1	4	0	1	1	0	0	0	0	2	3
Hempstead	1	4	294.12	1	1	0	2	2	0	2	0	1	3	0
North Hempstead	1	3	222.22	0	1	0	0	2	5	1	0	3	1	1
Huntington	3	3	666.66	0	0	0	1	1	0	0	1	0	0	0
Southold	0	2	400.00	0	0	0	0	0	1	0	0	0	1	1
Sag Harbor	0	2	333.33	0	0	0	0	0	1	0	1	0	2	0
Edgewater	0	3	136.36	2	2	0	2	1	1	1	2	1	0	5
Northfield	0	4	416.67	0	3	0	1	0	0	0	1	0	1	1
Westfield	0	6	350.00	3	0	1	0	0	3	2	0	1	1	2
YONKERS	0	21	423.72	2	7	0	2	1	4	9	1	2	1	5
Westchester	1	1	362.73	1	2	0	0	1	0	0	0	0	3	0
Mount Vernon	0	5	370.00	0	1	0	1	0	0	1	0	0	3	3
Sing Sing	0	3	307.69	0	4	0	0	0	0	0	0	0	1	4
New Rochelle	3	2	357.15	2	1	0	2	2	0	1	0	0	0	1
Rest of district	2	15	250.00	9	10	0	7	3	2	17	2	6	11	6
HUDSON VALLEY DIST:														
ALBANY	1	26	272.30	22	25	0	21	7	9	31	3	9	7	18
West Troy	2	9	230.77	2	2	0	2	3	2	3	0	0	0	0
Hoosick Falls	1	0	....	1	1	0	1	0	0	1	1	1	1	3
TROY	2	45	431.25	4	20	2	20	7	8	11	2	2	4	7
Lansingburgh	0	3	166.67	0	6	0	1	0	1	2	1	0	2	2
Green Island	0	1	428.57	0	0	0	1	0	0	0	0	1	1	1
Greenbush	0	0	105.26	2	3	0	3	0	2	1	0	4	0	2
Coxsackie	0	2	400.00	0	0	0	2	0	0	3	0	0	3	0
Catskill	0	1	200.00	0	0	0	0	0	0	4	0	0	0	0

Hudson	*10,000	14	16.80	5	34.3	0	0	1	1	0	0	0	0	0			214.30		2	0	5	1	1	0	0	1	0	0
Kingston	*21,100	17	9.67	4	23.8	1	0	0	2	0	0	0	0	0			238.80		1	0	3	1	4	1	0	0	2	0
Wawarsing	8,547	2	3.00	1	50.0	0	0	0	0	0	0	0	0	0			....		0	0	0	0	0	0	0	0	0	2
Rosendale	5,000	1	2.40	1	100.0	1	0	0	0	0	0	0	0	0	0	0	1000.00		0	2	0	0	0	0	0	0	0	0
Marbletown	4,000	5	15.00	2	40.0	0	0	0	0	0	0	0	0	0	2	1	600.00		0	0	0	0	0	0	0	1	1	0
Esopus	4,736	1	2.53	0	....	0	0	0	0	0	0	0	0	0	0	0	....		0		0	0	0	0	0	0	1	0
Saugerties	*4,000	7	21.00	5	71.4	0	0	0	0	0	0	0	0	0		2	428.57		0		0	0	0	0	0	9	2	2
Poughkeepsie	20,200	34	20.20	16	48.0	0	0	0	0	0	1	0	0	1		7	264.70		1		3	2	0	6	0		6	6
Fishkill	10,732	16	18.00	7	41.7	0	0	0	0	0	0		0		3	3	437.50	1	3		0	0	0	2	0		1	1
Wappinger Falls	5,000	15	36.00	10	66.6	0	0	0	2	0	0		0		0	6	600.00	0	1		0	0		2	0		0	1
Newburgh	*20,000	30	18.00	13	43.3	0	0	3		0	0		0	0		4	300.00	1	2			0	2	6	1		2	0
Port Jervis	*9,000	4	5.35	3	75.0	0	0	0	0	0	0		0	0	0	0	....	0	0			0	1	1	0		0	2
Middletown	*10,000	18	21.60	6	33.3	0	0	1	1	0	0		0	0	0	4	333.33	1	3			0	0	1	0		4	1
Goshen	4,387	9	24.62	4	44.4	0	0	0	0	0	0		0	0	0	4	444.44	0	2			0	0	2	0		0	0
Haverstraw	*7,000	15	25.71	7	41.3	0	0	0	0	0	0		0	0	1	2	200.00	0	4			1	0	2	1		0	2
Nyack	*5,000	15	36.00	7	46.7	0	0	0	0	0	0		0	0	6	3	600.00	0	0		0		0	1	2		0	2
Ramapo	5,000	9	21.60	4	44.4	0	0	0	0	0			0	1	0	2	833.33	0	1		1		1	0	0		1	0
Rest of district	....	212	....	84	39.6		0	6	1	0			0	2	8	43	301.88	9	12		23		10	17	10		36	14
Adirondack & Northern District:																												
Argyle	3,700	3	9.78	0	......	0	0	1	0	0	0	0	0		0	0	333.33	0			0		0	1				0
Greenwich	3,861	4	12.43	2	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1		0	0		0	0				1
Fort Edward	4,880	5	12.30	3	60.0	0	0	0	0	0	0	0	0	0	0	2	400.00	0		0			0	0				1
Queensbury	10,000	16	19.20	8	50.0	0	0	0	0	0	0	0	0	0	0	6	387.50	0		0			0	2				2
Crown Point	4,287	1	3.00	0	......	0	0	0	0	0	0		0	0	0	0	....	0		0			0	0			0	0
Port Henry	2,525	3	14.46	0	......	0	0	0	0	0	0		0	0	0	0	....	0		0			0	0			2	0
Malone	7,900	20	30.38	12	60.0	0	0	1	0	0	0		0	3	0	7	555.55	1					0				3	2
Ogdensburg	11,000	15	16.87	10	66.6	1	0	0	0	0	1		0	0	0	5	466.66	1					0		1		2	1
Gouverneur	5,500	9	19.64	3	33.3	0	0	0	0	0	0		0	0	1	1	222.22	1					1		0		0	1
Ellisburgh	4,812	2	5.00	0	.....	0	0	0	0	0	0		0	0	0	0	....	0					0		0		0	0
Plattsburgh	7,000	6	10.18	2	33.3	0	0	0	0	0	0		0	0	0	0	....	0					1		0			0
Watertown	12,309	27	26.00	12	44.4	0	0	0	0	0	0		0	1	1	7	333.33	0					4		1		0	2
Cape Vincent	3,143	4	15.27	1	25.0	0	0	0	0	0	0		0	0	0	1	250.00	1					1		0	0	0	0
Clayton	4,214	3	8.87	1	33.3	0	0	0	0	0	0		0	0	0	1	333.33	0					0		0	0	1	0
Rest of district	....	114	....	33	29.0	3	0	2	0	0	0		0		-6	14	254.36	6			11		5		5	4	28	8
Mohawk Val. Dist.:																												
Schenectady	15,000	30	24.00	16	53.3	0	0	0	1	0	0	0		0	4	8	433.33	0	5	0		0	1		0	1		5
Schoharie	3,350	4	14.33	0	......	0	0	0	0	0	0	0		0	0	0	....	1	0	0		0	0		1	0	0	0
Middleburgh	3,376	3	10.66	0	......	0	0	0	0	0	0	0		0	0	0	....	0	0	0		0	1		0	0	1	0
Amsterdam	*14,000	21	18.00	17	81.0	0	0	1	0	0	0	0	0	0	0	10	523.81	1	0	0		0			0	1	1	4
Johnstown	*6,000	5	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0		1	0		0	0	1	0
Gloversville	*10,000	10	12.00	5	50.0	0	0	0	0	0		0		0	0	4	400.00	0	2	0		0	1		1	0	0	2
Little Falls	7,200	11	18.08	8	72.8	0	0	1	0	0		0		0	0	6	636.36	0	0	0		0	0	3	0	1	0	0
Ilion	4,300	2	5.71	0	......	0	0	0	0	0	0	0	0		0	0	....	0	0	0	0	0		0	0	0	2	0
Utica	*39,000	102	31.64	30	38.9	5	0	2	1	0	1	0	1		0	5	150.00	8	17	0	30	2		8	4	1	7	4
Rome	12,045	22	22.00	9	40.9	0	0	0	0	0	0	0	0		0	8	363.36	0	0	0	0	2		8	0	0	6	1
Boonville	4,000	7	21.00	2	28.6	0	0	0	0	0	0	0	0		0	0	142.86	0		0	0	0		2	0	0	0	1
Camden	3,400	10	35.28	1	10.0	0	0	3	0	0	0	0	0		4	0	700.00	0		0	0	0		0	0	0	2	0
Waterford	4,326	8	22.19	4	50.0	0	0	0	0	0	0	0	0			2	250.00	1	2	0	0	0		0		0	1	0
Ballston Spa	3,300	6	21.82	2	33.3	0	0	0	0	0	0	0	0			2	333.33	0	0	0	1	0		0		0	2	0
Saratoga Springs	10,000	27	32.40	10	37.0	0	0	0	1	0	0	0	0			5	296.30	1	4	0		1			0	1	3	2
Rest of district	....	126	....	37	30.0		0	1	0	0	2	0	0			14	127.00	8	17	0		5			2	12	24	18

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*23,000	37	19.30	17	45.9	0	0	0	4	0	0	2	0	0	0	3	243.30	2	2	0	1	0	1	0	3	2	1	16
Owego	6,000	6	12.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	1	1	0	0	0	1
Candor	4,323	3	8.33	1	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	1	0	0	0	0
Waverly	3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	1	0	0	0	1
ELMIRA	*25,000	42	20.16	18	42.8	0	0	0	0	0	0	0	0	0	1	11	....	7	0	0	4	2	4	4	1	4	1	3
Horseheads	3,500	7	24.00	3	42.8	0	0	0	0	0	0	0	0	0	0	3	314.28	0	0	0	0	0	0	0	2	0	2	0
Bath	7,400	11	9.73	2	15.3	0	0	0	0	0	0	0	0	0	0	2	285.71	1	0	0	1	2	0	2	1	0	2	0
Olean	*8,000	16	24.00	7	43.6	0	0	1	0	0	0	0	0	0	0	5	172.72	0	1	1	1	0	1	0	1	0	2	3
JAMESTOWN	*12,000	17	17.00	8	47.0	0	0	1	0	0	0	0	0	0	2	6	375.00	0	2	0	1	0	2	2	1	0	0	1
Westfield	3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	470.58	0	0	0	0	0	1	0	0	0	1	0
Rest of district	....	42	....	11	25.0	0	0	1	1	0	0	0	0	0	1	7	....	4	2	0	4	1	2	9	1	0	5	4
EAST CENTRAL DIST:																												
Walton	3,541	5	17.00	2	40.0	0	0	0	0	0	0	0	0	0	0	1	258.85	0	2	1	0	0	0	0	0	0	0	1
Delhi	3,000	4	16.00	3	75.0	1	0	0	0	0	0	0	0	0	0	0	200.00	0	0	0	0	0	0	1	1	0	0	1
Franklin	*3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	250.00	0	0	0	1	0	0	0	0	0	0	0
Liberty	3,209	4	15.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	1	0	0	0	0	0	0	1
Oneonta	*5,000	9	21.80	1	11.1	0	0	0	0	0	0	0	0	0	1	1	....	1	1	0	0	0	1	0	0	2	0	2
Oneida	5,000	8	19.20	5	62.5	0	0	0	0	0	0	0	0	0	0	2	222.22	0	1	0	0	1	0	2	0	0	1	1
Baldwinsville	3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	1	250.00	0	1	0	0	0	0	0	0	0	0	0
SYRACUSE	*70,000	116	19.89	55	47.4	1	0	5	1	0	0	0	0	0	1	34	500.00	5	12	3	11	2	9	14	3	6	5	3
Geddes	7,000	9	15.43	4	44.4	1	0	0	1	0	0	0	0	0	0	2	457.75	0	1	0	1	0	1	0	0	0	0	2
Cortland	7,361	11	18.00	5	45.5	0	0	0	0	0	0	0	0	0	0	2	222.22	1	1	0	1	0	2	1	0	0	2	1
Homer	3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	1	0	0	0	0	0	0	1	2	0
Rest of district	....	108	....	20	18.6	1	0	2	0	0	0	1	0	0	5	7	146.30	3	9	3	13	0	9	12	3	10	16	14
WEST CENTRAL DIST:																												
AUBURN	*26,000	37	17.18	16	43.3	1	0	0	0	0	0	0	0	0	1	8	270.27	3	5	0	4	3	1	4	0	2	1	4
Ithaca	*10,000	18	21.60	6	33.3	0	0	0	0	0	0	0	0	0	0	4	222.22	0	1	0	0	3	1	3	0	3	2	1
Seneca Falls	*6,858	7	12.30	1	14.3	0	0	1	1	0	0	0	0	0	0	0	285.71	0	1	0	2	0	0	1	0	0	1	0
Manchester	*4,000	3	9.00	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	0	0	0	0	1	1
Phelps	*7,000	3	5.14	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	1	1	0	0	0	0	0	0
Canandaigua	6,300	5	9.52	1	20.0	0	0	0	0	0	0	0	0	1	0	1	400.00	1	0	0	0	0	1	0	0	1	0	0
Geneva	*6,000	13	26.00	5	38.0	0	0	1	1	0	0	0	0	1	0	1	307.70	0	1	0	0	1	1	2	2	1	1	0
Penn Yan	4,500	2	5.34	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	1	0

Lima	*2,800	2	8.57	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	1	1	0
Rest of district	....	73	....	15	20.5	0	0	0	2	0	0	0	0	2	1	11	220.00	1	9	0	0	3	4	12	5	3	13	5
LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	80	15.00	12	40.0	0	0	1	1	0	0	0	0	0	0	5	233.33	0	4	0	1	0	4	4	2	2	4	2
Richland	4,000	6	18.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	1	1	0	0	2	0
Fulton	*4,000	8	24.00	3	37.5	0	0	0	0	0	0	0	0	0	0	2	250.00	1	1	0	0	0	2	0	0	1	0	1
Clyde	*3,000	5	20.00	3	60.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	3	0	1	0	0
Lyons	*6,000	13	26.00	5	38.5	0	0	0	1	0	0	0	0	0	1	2	307.70	0	0	0	1	0	2	2	1	0	0	3
Newark	3,500	1	3.43	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	0
Palmyra	*4,800	6	15.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	2	0	1	2	0
Wolcott	3,753	4	12.78	2	50.0	0	0	0	0	0	0	0	0	0	0	2	500.00	0	1	0	1	0	0	0	0	0	0	0
ROCHESTER	*101,000	237	28.15	117	49.3	0	0	3	2	0	1	0	0	4	11	48	291.14	9	20	1	14	6	11	35	12	13	13	34
Brockport	4,500	6	16.00	4	66.6	0	0	0	0	0	0	0	0	0	0	2	333.33	0	1	0	0	0	0	0	0	1	1	1
Greece	*5,000	4	9.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	2	0
Albion	5,000	5	12.00	3	60.0	0	0	0	0	0	0	0	0	0	0	2	400.00	0	0	0	1	0	0	1	0	0	0	1
LOCKPORT	15,000	21	16.80	9	42.9	1	0	1	0	0	0	0	0	0	0	6	381.00	0	4	0	2	3	1	0	0	3	0	0
Tonawanda	4,900	6	14.70	4	66.6	0	0	0	0	0	0	0	0	0	1	3	666.66	1	0	1	0	0	0	0	0	0	0	0
Amherst	4,518	4	10.67	1	25.0	0	0	0	0	0	0	0	0	0	0	1	250.00	0	0	0	0	0	0	3	0	0	0	0
Hamburg	3,225	3	11.12	2	66.6	0	0	1	0	0	0	0	0	0	0	2	1000.00	0	0	0	0	0	0	0	0	0	0	0
Aurora	*3,000	5	20.00	1	20.0	0	0	0	0	0	0	0	0	0	0	2	400.00	0	0	0	0	0	0	1	0	0	2	0
Rest of district	....	152	....	50	34.0	0	0	3	0	0	2	0	1	2	0	31	256.60	3	11	3	14	4	18	16	7	9	18	10
Totals for the State	....	7,142	....	3,312	......	49	1	104	66	0	43	45	11	134	307	1484	....	480	861	58	528	330	309	657	153	266	458	738

REMARKS — The total reported mortality for August is 7,142; of which 46.3 per cent were under the age of five years. From Zymotic diseases there were 2,244 deaths, a ratio of 314.20 per 1,000 mortality. From Diarrhœal diseases, the ratio per 1,000 is 207.78; from Typhoid fever, 14.58; from Croup and Diphtheria, 43.00. From Consumption the ratio of mortality is 12.05 per 1,000, and 224.80 per 1,000 above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases, is 442.60. From Acute Respiratory diseases there were 67.20 deaths per 1,000. There have been 150 delayed returns received for July, 40 of which are deaths under five years of age. In comparison with the mortality reported in July, the absence this month of that of the cities of Buffalo and Cohoes should be noted. The mortality of the two months, July and August, 1885, corresponds closely with that of this year.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during September, 1886.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY....	*1,439,000	2,767	23.10	1,317	47.5	17	0	55	29	0	11	21	6	37	183	479	306.45	226	374	23	206	190	119	204	49	120	165	308
BROOKLYN..........	*630,000	1,810	22.80	712	54.3	0	1	12	14	0	8	4	2	30	70	225	279.38	109	160	10	136	65	60	130	26	37	12	229
Gravesend.........	*5,000	15	36.00	12	80.0	1	0	0	0	0	0	0	0	0	1	6	533.33	3	0	0	1	1	1	1	0	0	0	0
Flatlands.........	3,127	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	1	0	0	0	0	0	0	1
New Utrecht........	4,742	8	20.25	3	37.5	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	2	1	1	0	8
LONG ISLAND CITY.	*20,000	49	29.40	26	53.0	0	0	0	0	0	1	0	0	1	2	8	245.00	5	7	0	2	0	2	5	1	6	2	7
Newtown..........	*10,000	18	21.60	11	61.2	0	0	0	0	0	0	0	0	0	2	3	277.77	2	1	0	0	1	0	2	0	0	2	5
Oyster Bay.........	*12,000	24	24.00	9	37.5	0	0	0	1	0	0	0	0	0	0	2	125.00	2	3	0	3	0	1	2	2	8	1	4
Hempstead.........	18,100	18	12.00	11	61.1	0	0	1	1	0	1	0	0	0	0	7	555.55	0	3	0	2	0	0	1	1	1	0	0
North Hempstead....	*7,000	15	25.71	6	40.0	0	0	0	1	0	0	0	0	0	0	2	200.00	3	3	0	1	0	2	0	0	1	0	2
Huntington........	8,098	10	14.82	2	29.0	0	0	0	2	0	0	0	0	0	1	1	400.00	0	0	0	3	0	1	2	0	0	0	0
Babylon...........	4,739	6	15.20	3	50.0	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	0	0	1	1	0	0	1	1
Southold..........	7,207	8	13.22	6	75.0	0	0	1	1	0	0	0	0	0	1	2	625.00	0	0	0	2	0	0	0	0	0	0	1
Sag Harbor.........	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	0
Edgewater.........	*10,000	25	30.00	9	36.0	1	0	0	0	0	0	0	0	0	2	3	240.00	0	4	0	4	2	1	2	0	1	3	2
Northfield.........	7,014	15	25.71	6	40.0	0	0	0	0	0	0	0	0	0	2	4	400.00	0	2	0	1	0	0	1	1	1	1	2
Westfield..........	*7,000	1	1.72	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
YONKERS...........	*25,000	47	22.56	27	57.5	2	0	2	2	0	0	0	0	0	4	6	300.00	2	6	0	1	0	4	7	2	3	0	6
Westchester........	*6,900	7	12.20	4	57.1	0	0	1	1	0	0	0	0	1	0	2	714 28	0	0	0	0	0	0	0	0	0	2	0
Sing Sing.........	*6,500	17	31.32	4	23.5	0	0	0	0	0	0	0	0	0	1	1	117.50	1	3	0	3	0	1	1	0	1	4	1
New Rochelle.......	5,276	9	20.40	3	33.3	0	0	0	0	0	0	0	0	0	1	1	222.22	1	0	0	0	1	0	1	2	1	0	1
Rest of district.......	....	51	....	9	18.8	0	0	0	1	0	0	0	0	1	2	0	78.43	0	12	0	6	3	6	6	1	2	8	3
HUDSON VALLEY DIST:																												
ALBANY............	*96,000	136	17.00	53	38.9	2	0	8	0	0	0	0	0	6	6	14	264.85	13	18	1	15	7	15	2	6	2	4	18
West Troy.........	*13,000	23	21.23	13	56.5	0	0	2	0	0	0	0	0	0	5	6	477.73	2	1	0	8	0	0	1	0	0	0	8
Hoosick Falls.......	*6,000	9	18.00	4	44.5	0	0	0	0	0	0	0	0	1	1	0	222.22	0	1	0	2	1	0	2	0	0	0	1
TROY..............	*60,000	130	26.00	56	43.1	6	0	4	1	0	2	1	0	0	5	24	330.77	12	19	1	12	3	8	12	3	3	6	8
Lansingburgh.......	*9,700	11	17.79	8	57.1	0	0	1	0	0	0	0	0	1	0	6	571.42	1	2	0	1	0	1	0	0	0	1	0
Green Island.......	*5,000	11	36.00	7	60.0	0	0	0	0	0	0	0	0	0	0	5	357.15	1	3	0	0	0	0	3	0	0	2	0
Greenbush.........	*7,200	12	20.00	6	50.0	1	0	0	0	0	0	0	0	0	1	1	250.00	0	2	0	1	1	1	0	1	1	1	1
Coxsackie.........	4,000	9	27.00	4	44.5	0	0	1	0	0	0	0	0	0	1	1	666.66	2	0	0	0	0	0	0	0	0	1	0
Catskill............	*4,000	10	30.00	5	60.0	0	0	0	0	0	0	0	0	0	3	2	500.00	0	1	0	1	0	1	0	0	2	0	0

HUDSON	*10,000	16	19.20	6	37.5	0	0	0	1	0	0	0	0	0	0	4	312.50	1		0	0	2	2	2	0	1	0	1
KINGSTON	*21,100	29	16.50	10	34.4	0	0	1	0	0	0	0	0	0	0	2	111.11	5		0	4	3	3	3	0	2	3	0
Wawarsing	8,547	6	8.50	4	66.6	0	0	0	0	0	0	0	0	0	0	0	......	0		0	1	0	1	1	0	0	0	8
Rosendale	5,000	7	16.80	3	42.8	0	0	0	1	0	0	0	0	0	0	0	142.86	0		0	1	0	1	2	0	0	1	1
Marbletown	*4,000	2	6.00	0	....	0	0	0	0	0	0	0	0	0	0	0	......	0		0	2	0	0	0	0	0	0	0
Esopus	4,736	8	20.27	1	12.5	0	0	0	0	0	0	0	0	0	0	0	......	0		0	0	0	1	1	0	1	3	0
Saugerties	*4,000	3	9.00	1	33.3	0	0	0	0	0	0	0	0	0	0	0	......	1		0	0	0	0	0	0	0	1	1
POUGHKEEPSIE	20,200	25	14.30	6	24.0	0	0	0	1	0	1	0	0	0	0	0	80.00	1		0	1	2	4	2	1	2	3	4
Fishkill	10,732	10	11.50	2	20.0	0	0		0	0	0	0	0	0	0	1	200.00	2		0	0	0	0	1	0	3	0	1
Wappinger Falls	5,000	9	21.60	5	55.5	0	0		0	0	0	0	0	2	1	0	333.33	0	1	0		0	0	0	0	1	0	2
NEWBURGH	*20,000	32	19.20	13	40.6	1	0		1	0	0	0	0	0	1	0	125.00	2	3	0		1	2	3	0	0	1	2
Port Jervis	*9,000	10	13.45	2	20.0	0	0		0	0	0	0	0	0	0	0	......	0		0	2	1	0	1	0	2	1	2
Middletown	*10,000	13	15.60	0		0	0		0	0	0	0	0	0	0	0	77.00	1		0	1	0	1	4	0	0	2	2
Goshen	4,387	5	14.30	0	....	1	0		0	0	0	0	0	0	0	0	200.00	0		0	0	0	0	0	0	1	0	2
Haverstraw	*7,000	18	30.85	8	44.4	0	0		0	0	0	0	0	1	2	2	333.33	0	2	0	3	0		1	0	0	2	3
Nyack	*5,000	5	12.00	3	60.0	0	0		0	0	0	0	0	0	0	1	200.00	0	1	0	1	0		0	0	0	0	2
Ramapo	5,000	5	12.00	2	40.0	0	0	0	0	0	0	0	0	0	0	1	200.00	1	1	0	0	0	0	0	1	0	0	1
Rest of district	....	197	......	60	29.5	0	0	10	3	0	0	0	1	1	7	23	228.65	10	21		13	7	10	24	6	3	30	17
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	4	13.00	0	....	0			0	0	0	0	0	0	0	0	......	0	0	0	1	0	1	0	0	0	1	1
Greenwich	3,861	5	15.90	1	20.0	0			0	0	0	0	0	0	0	0	......	0	2	0	0	0	2	0	0	0	0	1
Salem	3,500	4	13.71	0		0			0	0	0	0	0	0	0	0	250.00	0	1	0	1	0	0	0	1	0	0	0
Fort Ann	4,267	2	5.75	0		0	0		0	0	0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	1	0
Fort Edward	4,850	5	12.30	0	....	0	0		0	0	0	0	0	0	0	0	......	0	2	0	0	1	2	0	0	0	0	0
Queensbury	10,000	18	21.60	6	33.3	1	0		0	0	2	0	0	0	0	3	333.33	0	3		1	1	2	1	1	0	1	0
Crown Point	4,287	6	16.78	2	33.3	0	0		0	0	0	0	0	0	0	2	333.33	0	2	0	0	0	0	1	0	1	0	0
Malone	7,908	14	20.00	8	61.5	0	0		0	0	0	0	0		0	6	500.00	1	3	0	0	0	0	2	1	0	0	0
OGDENSBURG	11,000	10	10.91	4	40.0	0	0		0	0	0	0	0		0	1	200.00	1	0	0	0	0	1	3	0	1	0	2
Gouverneur	5,500	11	24.00	3	27.3	1	0		0	0	0	0	0	0	2		273.73	1	2	0	0	1	2	1	0	0	0	0
Ellisburgh	4,812	11	27.43	2	18.2	0	0	1	0	0	0	0	0	0	1		272.72	0	1	0	0	1	0	1	2	0	0	0
Plattsburgh	7,000	6	10.33	3	50.0	0	0	0	0	0	0	0	0	0	0		333.33	0	1	0	0	0	3	0	0	0	0	0
Cape Vincent	3,143	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0		500.00	0	0	0	0	0	1	0	0	0	0	0
Clayton	4,214	8	22.78	4	50.0	0	0	0	0	0	0	0	0	1	0		375.00	0	0		1	0	0	0	0	1	0	2
Rest of district	....	120	......	32	26.7	0	0	5	0	0	0	0	1	2		18	225.00	3	18		10	2	7	8	5		27	[illegible]
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	40	32.00	11	27.5	0	0		0	0	2	0	0			3	260.00		8		3	4	3	5			[illegible]	3
Schoharie	3,850	8	28.65	1	12.5	0	0		0	0	0	0	0			1	125.00		1		1	0	0	2	1		1	0
Middleburgh	8,376	4	14.20	0	....	0	0		0	0	0	0	0			0	......		0		1	0	0	0	1	1	1	0
AMSTERDAM	*14,000	18	15.43	12	66.6	0	0	1	0	0	1	0	0	0		4	44.44				1	0	0	2	0	0	1	2
Johnstown	*6,000	8	16.00	4	50.0	0	0	0	0	0	0	0	0	1		2	375.00			0	0	1	0	1	0	0	0	0
Gloversville	*10,000	9	10.80	4	44.4	0	0	1	0	0	0	0	0	0		4	555.55			0	0	0	2	0	0	1	1	0
Little Falls	7,800	11	18.08	3	27.3	0	0	0	1	0	0	0	0	0		3	......			0	0	0	1	1	0	0	1	0
Ilion	4,200	6	17.14	2	33.3	0	0	0	0	0	0	0	0	0		2	333.33			0	0	2	0	0	1	0	0	0
UTICA	*39,000	93	28.60	38	41.0	0	0	4	1	0	1		0	0		4	......		9	1	23	2	8	18	2	6	3	9
ROME	12,045	21	21.00	6	21.6	0	0	0	0	0	0	0	1	0		3	190.48		1	1	2	0	2	2	1	0	6	1
Boonville	4,000	8	24.00	2	25.0	0	0	0	0	0	0	0	0	0	0	2	250.00		2	1	0	0	0	0	0	0	2	1
Camden	3,400	6	21.18	0	....	0	0	1	0	0	0	0	0	0	0	0	166.67	0	0	0	1	1	0	0	0	0	3	0
Waterford	4,376	7	19.38	4	57.2	0	0	0	0	0	0	0	0	0	1	3	428.57	1	1	0	0	0	0	0	0	0	1	1
Ballston Spa	3,300	6	21.82	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	1	0	0	0	0	0	3	0
Saratoga Springs	10,000	29	34.80	5	17.2	0	0	1	0	0	0	0	0	0	1	2	137.93	2	2	0	2	2	2	2	0	4	7	2
Rest of district	....	94	......	20	21.2	0	0	5	0	0	1	0	0	0	0	12	191.48	2	10	3	7	2	3	6	4	6	21	12

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during September, 1886.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,439,000	2,767	23.10	1,317	47.5	17	0	55	29	0	11	21	6	37	183	479	306.45	226	374	23	206	190	119	204	49	120	165	308
BROOKLYN	*620,000	1,310	22.80	712	54.3	0	1	12	11	0	8	4	2	30	70	225	279.38	109	160	10	106	65	60	130	26	37	12	229
Gravesend	*5,000	15	36.00	12	80.0	1	0	0	0	0	0	0	0	0	1	6	533.33	3	0	0	1	1	1	1	0	0	0	0
Flatlands	3,127	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	1	0	0	0	0	0	0	1
New Utrecht	4,742	8	20.25	3	37.5	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	2	1	1	0	3
LONG ISLAND CITY	*20,000	49	29.40	26	53.0	0	0	0	0	0	1	0	0	1	2	8	245.00	5	7	0	2	0	2	5	1	6	2	7
Newtown	*10,000	18	21.60	11	61.2	0	0	0	0	0	0	0	0	0	2	3	277.77	2	1	0	0	1	0	2	0	0	2	5
Oyster Bay	*12,000	24	24.00	9	37.5	0	0	0	1	0	0	0	0	0	0	2	125.00	2	3	0	3	0	1	2	2	3	1	4
Hempstead	18,160	18	12.00	11	61.1	0	0	1	1	0	1	0	0	0	0	7	555.55	0	3	0	2	0	0	1	1	1	0	0
North Hempstead	*7,000	15	25.71	6	40.0	0	0	0	1	0	0	0	0	0	0	2	200.00	3	3	0	1	0	2	0	0	1	0	2
Huntington	8,098	10	14.82	2	29.0	0	0	0	2	0	0	0	0	0	1	1	400.00	0	0	0	3	0	1	2	0	0	0	0
Babylon	4,739	6	15.20	3	50.0	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	0	0	1	1	0	0	1	1
Southold	7,267	8	13.22	6	75.0	0	0	1	1	0	0	0	0	0	1	2	625.00	0	0	0	2	0	0	0	0	0	0	1
Sag Harbor	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	0
Edgewater	*10,000	25	30.00	9	36.0	1	0	0	0	0	0	0	0	0	2	3	240.00	0	4	0	4	2	1	2	0	1	3	2
Northfield	7,014	15	25.71	6	40.0	0	0	0	0	0	0	0	0	0	2	4	400.00	0	2	0	1	0	0	1	1	1	1	2
Westfield	*7,000	1	1.72	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
YONKERS	*25,000	47	22.56	27	57.5	2	0	2	2	0	0	0	0	0	4	6	300.00	2	6	0	1	0	4	7	2	3	0	6
Westchester	*6,900	7	12.20	4	57.1	0	0	1	1	0	0	0	0	1	0	2	714.28	0	0	0	0	0	0	0	0	0	2	0
Sing Sing	*6,500	17	31.32	4	23.5	0	0	0	0	0	0	0	0	0	1	1	117.50	1	3	0	3	0	1	1	0	1	4	1
New Rochelle	5,276	9	20.40	3	33.3	0	0	0	0	0	0	0	0	0	1	1	222.22	1	0	0	0	1	0	1	2	1	0	1
Rest of district	....	51	....	9	18.8	0	0	0	1	0	0	0	0	1	2	0	78.43	0	12	0	6	3	6	6	1	2	8	3
HUDSON VALLEY DIST:																												
ALBANY	*96,000	136	17.00	53	38.9	2	0	8	0	0	0	0	0	6	6	14	264.85	12	18	1	15	7	15	2	6	2	4	18
West Troy	*13,000	23	21.23	13	56.5	0	0	2	0	0	0	0	0	0	5	6	477.78	2	1	0	3	0	0	1	0	0	0	3
Hoosick Falls	*6,000	9	18.00	4	44.5	0	0	0	0	0	0	0	0	1	1	0	222.22	0	1	0	2	1	0	2	0	0	0	1
TROY	*60,000	170	26.00	56	43.1	6	0	4	1	0	2	1	0	0	5	24	330.77	13	19	1	13	3	3	12	3	3	6	8
Lansingburgh	*9,700	14	17.79	8	57.1	0	0	1	0	0	0	0	0	1	0	6	571.43	1	2	0	1	0	1	0	0	0	1	0
Green Island	*5,000	14	36.00	7	50.0	0	0	0	0	0	0	0	0	0	0	5	357.15	1	3	0	0	0	0	3	0	0	2	0
Greenbush	*7,200	12	20.00	6	50.0	1	0	0	0	0	0	0	0	0	1	1	250.00	0	2	0	1	1	1	0	1	1	1	1
Coxsackie	4,000	9	27.00	4	44.5	0	0	1	0	0	0	0	0	0	1	1	666.66	2	0	0	0	0	0	0	0	0	1	0
Catskill	*4,000	10	30.00	5	50.0	0	0	0	0	0	0	0	0	0	3	2	500.00	0	1	0	1	0	1	0	0	2	0	0

HUDSON	*10,000	16	19.20	6	37.5	0	0	0	1	0	0	0	0	0			812.50	1	2	0	0	2			0	1	0	1
KINGSTON	*21,100	29	16.50	10	31.4	0	0	1	0	0	0	0	0	0			111.11	5	8	0	4	3			0	2	8	0
Wawarsing	8,547	6	8.50	4	66.6	0	0	0	0	0	0	0	0	0			......	0	0	0	1	0	1	1	0	0	0	8
Rosendale	5,000	7	16.80	3	42.8	0	0	0	1	0	0	0	0	0			142.86	0	0	0	1	0	1	2	0	0	1	1
Marbletown	*4,000	2	6.00	0	....	0	0	0	0	0	0	0	0				......	0	0	0	2	0	0	0	0	0	0	0
Esopus	4,736	8	20.27	1	12.5	0	0	0	0	0	0	0	0				......	0	2	0	0	0	1	1	0	1	3	0
Saugerties	*4,000	3	9.00	1	33.3	0	0	0	0	0	0	0				0	......	1	0	0	0	0	0	0	0	0	1	1
POUGHKEEPSIE	20,200	25	14.30	6	24.0	0	0	0	1	0	1	0				0	80.00	1	3	0	1	2	4	2	1	2	3	4
Fishkill	10,732	10	11.50	2	20.0	0	0	1	0	0	0	0				1	200.00	2	1		0	0	0	1	0	3	0	1
Wappinger Falls	5,000	9	21.60	5	55.5	0	0	0	0	0		0		2		0	333.33	0	1		2	0	0	0	0		0	2
NEWBURGH	*20,000	32	19.20	13	40.6	1	0	1	1	0		0		0		0	125.00	2			9	1	2	8	0		1	2
Port Jervis	*9,000	10	13.45	2	20.0	0	0	0	0	0		0		0	0	0	......	0			3	1	0		0		1	2
Middletown	*10,000	18	15.60	0		0	0	1	0	0		0	0	0	0	0	77.00	1		0	1		1		0		2	2
Goshen	4,387	5	14.30	0	....	1	0	0	0	0		0	0	0	0	0	200.00	0		0	0		0		0		0	2
Haverstraw	*7,000	18	30.85	8	44.4	0	0	1	0			0	0	1	2	2	333.33	0		0	3		1		0		2	3
Nyack	*5,000	5	12.00	3	60.0	0	0	0	0			0	0	0	0	1	200.00	0	1	0	1		0		0		0	2
Ramapo	5,000	5	12.00	2	40.0	0	0	0	0			0	0	0	0	1	200.00	1	1	0	0		0	0		0	0	1
Rest of district		197	......	60	29.5	0	0	10	3			0		1	7	23	228.65	10	21		13		10	24		13	30	17
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	4	13.00	0	....	0	0	0	0			0	0	0	0	0	......	0	0	0				0		0	1	1
Greenwich	3,861	5	15.90	1	20.0	0	0	0	0			0	0	0	0	0	......	0	2	0		0		0	0	0	0	1
Salem	3,500	4	13.71	0		0	0	1	0			0	0	0	0	0	250.00	0	1	0		0		0	1	0	0	0
Fort Ann	4,267	2	5.75	0		0	0	0	0		0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	1	0
Fort Edward	4,850	5	12.80	0	....	0	0	0	0		0	0	0	0	0	0	......	0	2	0	0	1	2	0	0	0	0	0
Queensbury	10,000	18	21.60	6	33.3	1	0	1	0			0	0	0	0		388.88	0	3	1	1	1	2			0	1	0
Crown Point	4,287	6	16.78	2	33.3	0	0		0			0	0	0	0		333.33	0	2	0	0	0	0			1	0	0
Malone	7,908	14	20.00	8	61.5	0	0		0			0	0	0	0		500.00		8	0	0	0	0			0	0	0
OGDENSBURG	11,000	10	10.91	4	40.0	0	0	1	0			0	0	0	0		200.00		0	0	0	0			0	1	0	2
Gouverneur	5,500	11	24.00	3	27.3	1	0	0	0			0	0	0	2	1	273.73	1	2	0	0	1			0	0	0	0
Ellisburgh	4,812	11	27.43	2	18.2	0	0	1	0			0	0	0	1	1	272.72	0	1	0	0	1		1	2	0	0	0
Plattsburgh	7,000	6	10.33	3	50.0	0	0	0	0			0	0	0	0	2	333.33	0	1	0	0	0		0	0	0	0	0
Cape Vincent	3,143	2	8.00	1	50.0	0	0	0	0			0	0	0	0	1	500.00	0	0	0	0	0		0	0	0	0	0
Clayton	4,214	8	22.78	4	50.0	0	0	0	0			0	0	1	0	2	375.00	0	0	1	1	0		0	0	1	0	2
Rest of district		120	......	32	26.7	0	0	5	0			0	1	2	1	18	225.00	3	18	4	10	2		8	5	2	27	[illegible]
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	40	32.00	11	27.5	0	0	0	0	0		0	0	0	5		260.00			0		4		5			1	8
Schoharie	3,850	8	28.65	1	12.5	0	0	0	0	0		0	0	0	0		125.00		1	0	1	0	0	2	1		1	0
Middleburgh	3,376	4	14.20	0	....	0	0	0	0	0		0	0	0	0		......	0	0	0	1	0	0	0	1		1	[illegible]
AMSTERDAM	*14,000	18	15.43	12	66.6	0	0		0	0	1	0	0	0	2		44.44	2	2	0	1	0	0	2	0	0	1	2
Johnstown	*6,000	8	16.00	4	50.0	0	0	0	0	0	0	0	0	1	0		875.00		2		0	1	0	1	0	0	0	0
Gloversville	*10,000	9	10.80	4	44.4	0	0	1	0	0	0	0	0	0	0		555.55		1	0	0	0	2	0	0	1	0	0
Little Falls	7,800	11	18.08	3	27.3	0	0	0	1	0	0	0	0	0	0		......		3	0	0	0	1	1	0	0	1	0
Ilion	4,200	6	17.14	2	33.3	0	0	0	0	0	0	0	0	0	0		833.33	0	1	0	0	2	0	0	1	0	0	0
UTICA	*39,000	93	28.60	38	41.0	0	0	4	1	0		0	0	0	2	4	......	5	9	1	21	2	8		2	6	3	9
ROME	12,045	21	21.00	6	21.6	0	0	0	0	0		0	1	0	0	3	190.48	1	1	1	2	0	2	2	1	0	6	1
Boonville	4,000	8	24.00	2	25.0	0	0	0	0	0		0	0	0	0	2	250.00	0	2	1	0	0	0	0	0	0	2	1
Camden	3,400	6	21.18	0	....	0	0	1	0	0		0	0	0	0	0	166.67	0	0	0	1	1	0	0	0	0	3	0
Waterford	4,326	7	19.38	4	57.2	0	0	0	0	0		0	0	0	1	2	428.57	1	1	0	0	0	0	0	0	0	1	1
Ballston Spa	3,300	6	21.82	2	33.3	0	0	0	0	0		0	0	0	0	1	166.67	0	1	0	1	0	0	0	0	0	3	0
Saratoga Springs	10,000	29	34.80	5	17.2	0	0	1	0	0		0	0	0	1	2	137.93	2	2	0	2	2	2	2	0	4	7	2
Rest of district		94	......	20	21.2	0	0	5	0	0		0	0	0	0	12	191.48	2	10	3	7	2	3	6	4	6	21	12

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(Continued).

	Populati	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*23,000	23	12.00	5	21.6	0	0	0	1	0	0	0	0	1	0	1	130.40	0	2	0	0	0	3	2	2	3	4	4
Owego	*6,000	9	18.00	4	37.5	1	0	2	0	0	0	0	0	0	0	0	333.33	0	1	0	1	0	0	2	0	0	0	2
Candor	4,328	9	24.90	1	11.1	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	1	0	0	3	2
Waverly	3,000	8	32.00	2	25.0	0	0	1	0	0	0	0	0	0	0	1	250.00	0	3	1	0	0	1	0	0	1	0	0
ELMIRA	*25,000	28	13.44	14	50.0	0	0	1	0	0	0	0	0	1	0	7	285.65	1	2	2	1	2	6	2	2	0	0	1
Horseheads	3,500	2	7.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	1	0
Bath	*3,500	6	20.56	1	16.7	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	0	3	0	0	1	0	0	1	0
Olean	*8,000	10	15.00	4	40.0	0	0	2	0	0	0	0	0	0	0	0	200.00	0	1	0	2	0	1	3	0	0	0	1
JAMESTOWN	*12,000	13	13.00	4	30.8	0	0	0	0	0	0	0	1	0	0	3	307.70	3	0	0	2	0	0	2	1	0	0	1
Westfield	3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	0
Rest of district	....	71	....	15	21.4	0	0	7	0	0	0	0	0	0	6	6	271.43	2	10	0	4	1	7	13	1	3	9	2
EAST CENTRAL DIST:																												
Walton	3,541	1	8.50	0	......	0	0	1	0	0	0	0	0	0	0	0	1000.00	0	0	0	0	0	0	0	0	0	0	0
Delhi	3,000	8	12.00	2	66.6	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	1	0	0
Cooperstown	*3,000	8	28.00	2	28.6	0	0	0	0	0	0	0	0	0	0	3	428.57	0	0	0	1	0	0	2	1	0	1	0
Oneonta	*5,000	14	38.60	6	42.8	0	0	3	0	0	0	0	0	0	5	3	785.71	0	0	0	1	0	1	1	0	0	0	0
Cazenovia	4,363	10	27.52	3	30.0	0	0	0	0	0	0	0	0	0	0	1	100.00	1	0	0	0	0	1	1	0	4	1	1
Oneida	5,000	3	7.20	2	66.6	0	0	0	0	0	0	0	0	0	0	2	666.66	0	0	0	0	0	0	0	0	0	1	0
Brookfield	3,685	5	16.22	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	2	0	0	0	1	0
Canastota	2,500	2	10.00	1	50.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	1	0	0	0	0	0	0	0	0	0
SYRACUSE	*70,000	84	14.40	21	25.0	0	0	3	1	0	0	0	1	0	0	16	250.00	5	21	0	6	5	7	11	2	3	3	0
Geddes	7,000	14	20.00	3	21.4	0	0	1	0	0	0	0	0	0	0	1	142.85	0	3	1	2	0	1	1	2	0	2	0
Cortland	7,861	3	5.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	1	1
Homer	3,000	7	28.00	3	42.8	0	0	0	0	0	0	0	0	0	0	1	142.85	0	0	0	3	0	0	0	1	0	0	2
Rest of district	....	107	....	20	19.0	0	0	2	0	0	0	0	2	2	6	11	[illegible]	1	15	0	9	6	11	8	7	5	17	4
WEST CENTRAL DIST:																												
AUBURN	*26,000	35	16.35	13	37.2	1	0	0	0	0	0	0	0	1	0	6	228.55	2	8	0	4	1	4	9	0	1	0	8
Ithaca	*10,000	15	18.00	2	13.3	0	0	0	0	0	0	0	0	0	4	0	266.66	1	2	0	2	0	1	1	0	1	2	1
Hector	5,000	1	2.20	1	100.0	0	0	0	0	0	0	0	0	0	0	1	1000.00	0	0	0	0	0	0	0	0	0	0	0
Seneca Falls	*6,853	16	28.00	4	25.0	0	0	0	1	0	0	0	0	0	0	0	62.50	1	1	0	2	1	0	1	1	1	2	5
Manchester	*1,000	7	21.00	4	57.2	0	0	0	0	0	0	0	0	0	0	3	428.57	0	2	0	0	0	0	1	0	0	0	1
Phelps	*7,000	9	15.43	3	33.3	0	0	1	0	0	0	0	0	0	0	1	222.22	0	1	0	0	0	1	0	0	0	3	2
Canandaigua	6,300	5	9.52	1	20.0	0	0	1	0	0	0	0	0	0	1	1	600.00	0	0	0	0	0	0	0	0	0	1	1

Geneva	*6,000	9	18.00	2	22.2	0	0	0	0	0	0	0	0	0	0	1	111.11	0	2	0	0	0	0	0	0	2	4	0
Penn Yan	4,500	6	46.00	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	0	3	2
Lima	*2,800	1	4.30	1	100.0	0	0	0	0	0	0	0	0	0	0	1	1000.00	0	0	0	0	0	0	0	0	0	0	0
Rest of district	....	85	....	26	30.5	0	0	4	2	0	0	0	0	2	0	10	211.75	4	13	3	7	3	1	12	0	5	12	7
LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	28	14.00	10	35.7	0	0	1	0	0	0	0	1	0	0	4	214.28	0	3	0	1	1	6	5	1	0	2	3
Richland	4,000	4	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	3	0	0	0	0
Fulton	*4,000	3	9.00	1	33.3	0	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	1	1
Lyons	*6,000	7	14.00	2	28.6	0	0	1	0	0	0	0	0	0	0	1	285.80	0	0	0	0	0	0	1	1	1	2	0
Newark	3,500	4	13.71	1	25.0	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	1	1	0	0	0	0	0	0	1
Palmyra	*4,200	4	10.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	0	0	2	0
Wolcott	3,753	5	15.90	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.00	0	0	0	0	0	0	1	0	1	2	0
ROCHESTER	*101,000	215	25.55	96	44.6	0	0	7	0	0	3	0	1	2	11	30	251.16	10	30	1	10	3	14	38	6	9	9	31
Brockport	4,500	3	8.00	0	......	0	0	0	1	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	2	0
Mendon	3,200	3	11.25	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	0	0	0	0	1	0
Brighton	3,736	†2	6.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	0	0
Albion	*5,000	5	12.00	1	20.0	0	0	0	0	0	0	0	0	0	0	1	200.07	0	2	0	0	0	0	0	1	0	1	0
LOCKPORT	*15,000	14	11.20	6	42.8	1	0	0	0	0	0	0	0	0	0	3	214.28	0	2	1	0	1	1	0	1	1	0	3
BUFFALO	*202,818	‡370	23.12	211	57.0	4	0	3	3	0	2	0	2	1	16	99	351.35	18	32	1	31	8	14	46	4	14	11	61
Tonawanda	4,900	8	19.58	3	37.5	0	0	2	0	0	0	0	0	0	1	0	375.00	4	0	0	0	0	0	1	0	0	0	0
Amherst	4,518	6	16.00	1	16.6	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	0	0	0	0	1	2	0	2	0
Aurora	*3,000	6	24.00	1	16.6	0	0	0	0	0	0	0	0	0	0	2	333.33	0	0	0	0	1	1	0	0	0	2	0
Rest of district	....	145	....	55	37.8	1	0	5	2	0	0	0	0	1	1	34	303.45	12	13	2	14	6	8	13	4	5	14	10
Totals for the State	....	7,239	....	3,206	......	42	1	176	74	....	36	26	19	100	323	1186	....	497	919	61	583	352	386	674	165	298	474	843

† Besides eight in Monroe County Hospital.

‡ For four weeks ending September twenty-fifth.

REMARKS — The total reported mortality for September is 7,239; of which 44.3 per cent were under the age of five years. From Zymotic diseases there were 1,960 deaths, a ratio of 272.88 per 1,000 mortality. From Diarrhœal diseases, the ratio per 1,000 is 165.40; from Typhoid fever, 24.49; from Croup and Diphtheria, 44.78, there being a continued prevalence to a mild degree generally of the last reported in various parts of the State. From Consumption the ratio of mortality is 127.34 per 1,000, and 228.76 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases, is 406.62. From Acute Respiratory diseases there were 67.26 deaths per 1,000. For the preceding month 215 delayed returns, of which 80 are under the age of five years have been received. No returns are received from the cities of Cohoes and Watertown. The town of New Lots had become a part of the city of Brooklyn.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during October, 1886.

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of—	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal).	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY	*1,439,000	2,977	23.66	1,275	42.8	10	0	59	44	0	18	48	5	30	254	234	235.82	400	432	18	173	101	118	240	69	126	204	294
BROOKLYN	*690,000	1,321	22.59	575	43.5	0	1	19	32	2	13	8	2	23	125	89	158.21	179	168	10	82	60	80	132	28	28	17	221
Gravesend	*5,000	5	12.00	2	40.0	0	0	0	0	0	0	0	0	0	1	0	200.00	0	0	0	0	1	0	0	0	1	0	2
New Utrecht	4,742	11	27.83	4	36.4	0	0	0	0	0	0	0	0	0	0	1	91.91	1	1	0	1	0	1	3	0	0	0	3
LONG ISLAND CITY	*20,000	50	30.00	20	40.0	0	0	0	0	0	3	0	0	0	4	7	140.00	4	6	0	6	2	1	7	2	3	0	5
Newtown	*10,000	38	45.60	15	38.4	0	0	2	1	0	0	0	0	2	6	0	289.47	5	3	0	2	0	1	6	0	4	1	5
Oyster Bay	*12,000	18	18.00	9	50.0	0	0	0	0	0	0	0	0	0	0	3	166.67	2	3	0	0	0	1	3	0	0	4	3
North Hempstead	*7,000	10	18.15	2	20.0	0	0	0	0	0	0	0	0	0	2	0	200.00	0	0	0	1	0	1	1	2	2	1	0
Huntington	8,098	11	16.30	2	18.2	0	0	0	0	0	0	0	0	0	1	0	181.82	1	2	0	2	0	1	3	0	0	1	0
Jamaica	10,089	28	33.26	11	39.3	0	0	1	0	0	0	0	0	0	9	3	464.28	1	3		1	1	0	0	0	0	7	1
Babylon	4,739	9	22.78	4	44.4	0	0	0	0	0	0	0	0	[illegible]	0	0	111.11	1	1		2	0	1	0	0	0	2	1
Southold	7,267	11	13.15	3	27.2	0	0	1	1	0	0	0	0	0	0	1	271.72	0	2		1	0	0	2	0	0	1	2
Riverhead	4,000	6	18.00	0	......	0	0	0	0	0	0	0	0	0	0	1	166.67	1	1		0	0	0	0	1	0	2	0
Sag Harbor	*3,000	2	8.00	2	100.0	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0		1	0	0	0	0	0	0	0
Edgewater	*10,000	15	18.20	3	20.0	0	0	0	2	0	0	0	0	0	1	0	200.00	4	1		3	0	1	0	1	0	1	1
Northfield	7,014	9	15.43	2	22.2	0	0	0	0	0	0	0	0	0	1	0	111.11	1	1		0	2	1	0	1	0	2	0
Westfield	*7,000	10	17.15	3	30.0	0	0	0	0	0	0	0	0	0	0	0	....	2	3	0	4	1	0	0	0	0	0	0
YONKERS	*22,000	44	24.00	23	52.3	2	0	0	1	0	0	0	0	0	5	0	181.82	4	1	0	3	3	6	7	3	7	1	1
Westchester	*6,300	9	15.67	3	33.3	0	0	0	1	0	0	0	0	1	0	1	833.33	0	1	0	0	1	0	0	0	4	0	0
Sing Sing	*6,500	8	15.00	3	......	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	0	2	0	2	0	0	0
New Rochelle	5,276	11	25.18	1	9.1	0	0	0	0	0	0	0	0	0	2	0	181.82	0	3	0	0	0	2	0	1	3	0	0
Rest of district	....	69	....	13	20.0	0	0	2	2	0	1	1	2	1	0	6	217.40	5	10	0	2	5	5	8	2	2	6	9
HUDSON VALLEY DIST:																												
ALBANY	*96,000	177	22.12	53	30.0	2	0	6	1	0	1	0	0	6	8	2	141.25	14	40	1	12	10	15	5	7	5	7	36
COHOES	20,000	26	15.60	13	50.0	0	0	2	0	0	0	0	0	0	8	0	230.77	4	4	0	2	0	1	4	1	0	1	3
West Troy	13,000	18	16.77	10	55.5	0	0	2	0	0	0	0	0	1	3	0	333.33	2	1	0	1	0	1	3	0	0	2	2
Hoosick Falls	*6,000	11	22.00	5	45.5	0	0	0	0	0	0	0	0	0	2	0	254.65	2	1	0	1	0	1	1	0	0	2	0
TROY	*60,000	122	21.40	36	29.1	7	0	6	0	0	0	1	0	6	14	8	201.34	20	17	1	5	6	7	11	0	5	2	13
Lansingburgh	*9,700	15	18.55	6	40.0	0	0	1	0	0	0	0	0	0	1	0	183.33	1	2	0	2	1	0	1	1	1	2	2
Green Island	*5,000	13	31.20	1	8.0	1	0	0	1	0	0	0	0	0	0	0	153.80	5	4	0	0	0	0	0	0	2	0	0
Greenbush	*7,200	6	10.00	3	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	1	0	0	3
Coxsackie	4,000	8	24.00	5	62.5	0	0	0	0	0	0	0	0	3	1	0	500.00	0	0	0	0	0	0	2	0	2	0	0

Catskill	*4,600	8	20.87	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00		0	0	1	1		0	0			0
HUDSON	*10,000	9	10.80	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	3	2	0	1	0		1	0			0
KINGSTON	*21,100	31	17.63	9	30.0	0	0	0	2	0	0	0	0	0	6	1	290.33	2	3	0	6			1	1	1		0
Wawarsing	8,517	6	17.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0			0	0	0		1
Rosendale	5,000	7	16.80	0	......	0	0	1	1	0	0	0	0	0	0	0	285.72	0	0	0	2	0	1	1	0	0		1
Marbletown	4,000	5	15.00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	1	0	0	0	0	0		0
Esopus	4,786	3	7.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0		1
Saugerties	*4,000	8	24.00	2	25.0	0	0	0	0	0	0	0	0	0	2	0	250.00	0	2	0	1	0	0	1	0	0		1
POUGHKEEPSIE	20,200	24	14.25	7	29.2	0	0	0	0	0	1	0	1	0	5	0	291.68	2	4	0	0	0	2	2	1	0		5
Fishkill	10,732	9	10.10	4	44.5	0	0	0	0	0	0	0	0	0	4	0	444.45	0	0	0	0	1	0	0	0	0		2
Wappinger Falls	5,000	7	16.80	3	42.8	0	0	0	0	0	0	0	0	1	3	0	428.57	1	2	0	0	0	0	0	0	0		0
NEWBURGH	*20,000	32	19.20	13	40.6	0	0	3	1	0	0	0	0	0	2	0	187.50	3	2	0	5	2		7	0	0	2	1
Port Jervis	*9,000	17	22.67	4	23.6	0	0	1	0	0	0	0	0	0	0	1	117.65	1	3	1	0	0		1	0	1	2	3
Middletown	*10,000	20	24.00	4	20.0	0	0	0	0	0	0	0	0	0	0	3	150.00	3	2	0	3	0			0	0	0	0
Goshen	4,387	5	14.30	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0			0	0	0	1
Haverstraw	*7,000	8	13.71	4	50.0	0	0	0		0	0	0	0	0	1	0	250.00	2	0	0					1	0	0	0
Nyack	*5,000	10	24.00	5	50.0	0	0	0		0	0	0	0	0	3	1	300.00	1	2	0					0	0	0	1
Ramapo	5,000	8	19.20	4	50.0	0	0	0		0	0	0	0	0	1	2	375.00	0	0	0	2		0	1	0	0	1	1
Rest of district	....	151	....	85	23.3	0	0	7		0	5	0	0	2	4	5	173.30	13	20	1	10		12	25	7	7	20	6
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	6	19.45	0	......	0	0	1	0	0	0	0	0	0	0	1	333.33	0			0		1			0	0	1
Greenwich	3,861	2	6.25	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1			0		0			0	1	0
Fort Ann	4,267	2	5.62	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0			1		0			0	0	0
Fort Edward	4,880	7	17.22	3	42.8	0	0	0	0	0	0	0	0	0	1	0	142.85	0			0		0			1	0	1
Queensbury	10,000	15	18.00	5	33.3	0	0	0	0	0	0	0	0	0	0	0	....	2	4		2		3			1	1	0
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0	0	0	0	0	0		500.00	0	0		0		0			0	0	0
Malone	7,908	12	18.23	5	41.7	0	0	1	0	0	0	0	0	2	2		500.00	1	0		1		1			0	3	0
OGDENSBURG	11,000	13	14.19	6	46.1	0	0	0	0	0	0	0	0	0	1	1	153.85	2	6		1		0			0	0	2
Gouverneur	5,500	8	17.45	1	12.5	0	0	0	0	0	0	0	0	0	4	0	500.00	1	0		0		1			0	2	0
Ellisburgh	4,618	5	13.04	1	20.0	0	0	0	0	0	0			0	0	0	....	1	0		1		1			0	0	1
Plattsburgh	7,000	8	13.71	0	......	0	0	0	1	0	0			0	0	0	125.00		2	0	0		0		1	0	1	0
WATERTOWN	12,200	14	13.77	3	21.4	0	0	1	1	0	0			0	1	2	357.21		2	0	0		0		0	1	1	0
Cape Vincent	3,143	2	7.70	0	......	0	0	0	0	0	0			0	0	0	....		0		0			0	0	0	1	0
Clayton	4,214	3	8.60	2	66.6	0	0	0	0	0	0			1	0	0	333.33		0		0		1	0	0	0	0	0
Rest of district	....	128	....	36	28.0	1	0	6	0	0	1			6	4	10	215.38		16				6	13	1	7	26	11
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	21	16.80	6	28.6	0	0	0	0	0	0		0	0	0	3	142.86	3		0	2				0	1	0	2
Schoharie	3,350	4	14.00	0	......	0	0	0	0	0	0		0	0	0	0	....	0		0	1		0		0	1	1	1
AMSTERDAM	*14,000	14	12.00	4	28.4	0	0	0	0	0	0		0	0	1	0	71.43	3		0	0		2		1	0	0	1
Johnstown	*6,000	10	20.00	1	10.0	0	0	2	0	0	0		0	0	0	0	200.00			0	3		0		0	0	0	1
Gloversville	*10,000	5	6.00	2	40.0	0	0	0	0	0	0		0	0	0	0	....			0	0		0		0	1	0	0
Little Falls	7,300	3	5.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0		0			0		0	1	0	0
Ilion	4,200	3	8.57	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1		0			0		0	0	0	0
UTICA	*39,000	58	17.70	13	22.4	3	0	2	2	0	1	0	0	0	2	0	120.68	6		0			2		2	2	7	6
ROME	12,045	24	24.00	4	16.6	0	0		0	0	0	0	0	0	0	0	41.67	1	2	0					2	5	4	1
Boonville	4,000	2	6.00	0	......	0	0		0	0	0	0	0	0	0	0	....	0	0	0					0	0	2	0
Camden	3,400	4	14.12	0	......	0	0		0	0	0	0	0	0	0	0	....	0	0	0	3	1			0	0	0	0
Waterford	4,326	9	24.96	2	22.2	0	0	1	0	0	0	0	0	0	0	0	111.11	1	3	0	1	1			0	1	0	0
Ballston Spa	3,300	4	14.54	1	25.0	0	0	0	0	0	0	0	0	0	3	0	750.00	0	0	0	0	0			1	0	0	0
Saratoga Springs	10,000	23	27.60	5	21.8	0	0	0	0	0	1	0	0	0	1	0	87.00	2	2	0	2				1	1	6	4
Rest of district	....	101	....	21	20.0	2	0	2	0	0	0	0	0	3	3	5	150.00	4	11	0	13				3	7	27	7

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH — (*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
SOUTHERN TIER DIST.:																												
BINGHAMTON	*23,000	45	23.48	12	26.7	0	0	1	4	0	1	0	0	0	4	5	333.33	4	2	1	1	0	10	2	1	0	4	5
Owego	*6,000	1	2.00	1	100.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	1
Waverly	3,000	4	16.00	1	25.0	0	0	0	0	0	0	0	0	0	3	0	750.00	1	0	0	0	0	0	0	0	0	0	0
ELMIRA	*25,000	27	13.00	6	22.2	0	0	2	0	0	0	0	0	0	0	3	185.18	2	2	1	8	3	5	3	0	1	0	2
Horseheads	3,500	2	7.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	1	0
Bath	*3,500	8	27.43	0	......	0	0	0	0	0	1	0	0	0		0	125.00	0	2	0	0	0	0	0	2	0	2	1
Olean	*8,000	11	16.50	2	18.2	0	0	2	0	0	0	0	1	0	1	0	363.63	0	2	0	0	0	0	3	0	0	1	1
JAMESTOWN	*12,000	16	16.00	8	50.0	0	0	0	0	0	0	0	1	0	3	0	250.00	2	1	0	4	1	1	2	0	0	0	1
Rest of district	....	73	....	10	13.7	0	0	2	0	0	0	0	1	0	1	1	68.50	5	5	0	8	4	6	7	7	1	20	5
EAST CENTRAL DIST.:																												
Walton	3,541	1	3.88	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Liberty	3,209	7	26.28	2	28.6	0	0	0	0	0	0	0	0	0	2	1	428.57	0	1	0	0	1	0	0	0	0	2	0
Cooperstown	*3,000	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	1	1	1000.00	0	0	0	0	0	0	0	0	0	0	0
Oneonta	*5,000	21	50.40	7	33.3	0	0	3	0	0	0	0	0	0	11	0	666.67	0	0	0	1	0	1	1	0	0	2	2
Worcester	*3,000	2	8.00	0	......	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	0	0	0	1	0	0	0	0
Oneida	5,000	3	7.20	0	......	0	0	9	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	1	1
Brookfield	3,685	3	10.00	2	66.6	0	0	0	0	0	0	0	0	0	0	1	333.33	0	0	0	0	0	0	1	0	0	0	1
Canastota	2,500	7	33.60	1	14.3	0	0	1	0	0	0	0	0	0	5	0	857.14	0	0	0	1	0	0	0	0	0	0	0
Skaneateles	4,866	7	17.27	2	28.6	0	0	0	0	0	0	0	0	0	2	1	285.70	0	0	0	0	0	1	0	0	0	2	1
SYRACUSE	*70,000	83	14.23	16	19.2	0	0	5	1	0	0	0	0	0	2	5	156.63	8	12	6	5	5	7	4	6	8	6	8
Geddes	7,000	5	8.57	2	40.0	0	0	1	0	0	0	0	0	0	0	2	600.00	0	0	0	0	0	1	0	0	0	0	1
Rest of district	....	133	....	15	11.3	0	0	7	1	0	0	0	1	0	8	7	180.00	10	16	1	5	2	12	12	4	0	34	6
WEST CENTRAL DIST.:																												
AUBURN	*26,000	35	16.15	10	28.5	2	0	4	4	0	0	0	0	0	1	5	400.00	4	6	0	0	0	0	6	0	1	0	2
Ithaca	*10,000	13	15.60	4	30.7	0	0	0	0	0	0	0	0	0	4	0	307.70	1	1	0	1	0	2	1	0	1	1	1
Waterloo	*4,500	6	16.00	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	3	0	0	0	1	0	0	0	1	1
Hector	5,000	6	14.40	2	33.3	0	0	0	0	0	0	0	0	0	0	1	166.67	0	0	0	0	0	0	1	1	1	1	1
Seneca Falls	*6,853	1	2.20	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	0	0	0
Manchester	*4,000	3	9.00	1	33.3	0	0	0	0	0	0	0	0	0	0	1	333.33	1	1	0	0	0	0	0	0	0	0	0
Phelps	*7,000	6	10.80	1	16.6	0	0	0	0	0	0	0	0	0	0	1	166.67	0	1	0	0	0	0	1	0	0	3	0
Geneva	*6,000	5	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	1	0	0	0	0	2	0
Attica	8,100	6	23.22	3	50.0	0	0	0	0	0	0	0	0	0	0	4	666.66	0	1	0	0	0	0	0	0	0	0	1
Penn Yan	4,500	10	26.66	2	20.0	0	0	1	0	0	0	0	0	0	0	1	100.00	0	3	0	0	0	1	0	0	1	3	0
Dansville	*3,700	5	16.22	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	1	0	1	0	0	0	0	8	0
Rest of district	....	66	....	15	22.7	1	0	1	0	0	0	0	0	0	1	4	166.66	1	8	0	7	2	5	6	5	8	17	7

LAKE ONTARIO AND WESTERN DISTRICT																												
OSWEGO	*24,000	20	10.00	4	20.0	0	0	1	2	0	0	0	0	0	1	0	200.00	2	3	0	3	1	1	1	1	0	2	2
Fulton	4,000	3	9.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	0	0	0	0	0	0
Clyde	*3,000	2	8.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	1	0
Lyons	*6,000	11	22.00	2	18.2	0	0	0	1	0	0	0	0	0	1	0	181.81	1	2	1	0	0	3	0	0	1	0	1
Newark	3,500	1	3.43	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	0
Palmyra	*4,800	4	10.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	1	0	0	0	0	1	0
Wolcott	3,753	6	19.18	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	1	0	0	2	0
ROCHESTER	*101,000	170	20.00	58	34.1	0	0	5	2	0	0	0	0	4	24	10	284.70	20	16	0	13	14	12	21	0	5	10	14
Brockport	4,500	4	10.67	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	1	1	0	0	0	0	0	0
Greece	*5,000	6	14.50	1	16.6	0	0	0	0	0	0	0	0	1	0	0	166.67	0	0	0	1	0	0	2	1	0	1	0
Brighton	3,736	†6	19.26	2	33.3	0	0	0	0	0	0	0	0	0	0	2	333.33	1	1	0	0	0	0	0	1	0	0	1
Albion	*5,000	5	12 00	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	1	1	1	0	0	1
LOCKPORT	*15,000	16	12.80	2	12.5	0	0	0	0	0	0	0	0	0	0	0	....	1	4	0	1	2	1	0	1	1	3	2
BUFFALO	*202,818	‡391	20 10	188	46.8	1	0	19	5	0	3	0	1	0	39	35	263.42	22	35	3	28	7	18	68	10	14	12	76
Tonawanda	4,900	7	17.50	3	42.8	0	0	0	0	0	0	0	0	0	2	0	285.71	1	0	1	0	0	0	0	0	0	2	1
Hamburg	8,235	6	22.25	1	16.7	0	0	0	0	0	0	0	0	0	0	1	166.67	1	1	0	0	0	2	0	1	0	0	0
Aurora	*3,000	3	12.00	0	.....	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	1	0
Rest of district	....	139	....	27	19.2	0	0	8	0	0	1	0	2	0	4	8	164.25	12	23	1	20	3	7	6	4	4	25	11
Totals for the State	....	7,370	....	2,730	.....	32	1	194	113	2	51	53	17	88	618	493	....	845	985	50	497	306	407	692	193	294	549	825

† Besides nine in Monroe County Hospital.

‡ For five weeks ending September twenty-fifth.

REMARKS.—The total reported mortality for October is 7,370, of which 37 per cent were under the age of five years. From Zymotic diseases there were 1,667 deaths, a ratio of 226.20 per 1,000 mortality. From Diarrhœal diseases, the ratio per 1,000 is 66.89; from Typhoid fever, 26.32; from Croup and Diphtheria, 83.85. Both the latter diseases are reported as mildly prevalent in various localities. From Consumption the ratio of mortality is 133.78 per 1,000, and 212.29 per 1,000 deaths above the age of five years. The combined death ratio per 1,000 from Zymotic diseases, Consumption and Puerperal diseases is 366.62. From Acute Respiratory diseases there were 114.66 deaths per 1,000 total mortality. For the preceding month 321 delayed returns have been received, of which 33 are from Cohoes; the total mortality for the month to this date being 7,500.

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH.

Abstract of Reports of Deaths and their causes in the following Districts, Cities and Towns, during November, 1886.

	Population.	Total number of deaths.	Representing annual death rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles.	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system (not diarrhœal.)	Diseases of urinary system.	Diseases of circulatory system.	Diseases of nervous system.	Cancer.	Accidents and violence.	Old age.	Unclassified.
MARITIME DISTRICT:																												
NEW YORK CITY....	*1,439,000	3,076	25.94	1,290	41.9	25		43	85	1	23	166	7	13	314	87	232.40	540	459	25	188	179	160	219	64	127	194	256
BROOKLYN..........	*690,000	1,248	22.00	405	37.3	0	1	33	59	0	15	17	1	12	139	21	222.75	219	165	9	52	50	76	112	30	38	30	169
Gravesend...........	*5,000	6	14.50	2	33.3	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	1	1	0	1	0	0
New Utrecht........	4,742	9	22.78	1	11.1	0	0	0	0	0	3	0	0	0	0	0	333.33	1	1	0	0	0	0	1	0	1	0	2
LONG ISLAND CITY..	*20,000	39	23.40	16	41.0	0	0	0	0	0	0	0	1	1	6	2	256.40	8	3	2	0	2	3	4	1	2	2	2
Newtown..............	*10,000	15	18.00	6	40.0	0	0	0	0	0	0	0	0	0	4	0	266.67	2	2	0	0	0	0	1	0	0	1	5
Oyster Bay...........	*12,000	13	13.00	8	61.5	0	0	0	0	0	0	0	0	0	0	0	....	2	0	0	0	1	1	5	0	0	2	2
Hempstead...........	18,160	11	7.40	3	27.3	0	0	0	0	0	0	0	0	0	0	2	272.73	1	2	0	1	0	4	0	0	0	1	0
North Hempstead....	*7,000	5	8.58	2	40.0	0		0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	1	1	0	0	0	1
Huntington...........	8,098	10	13.34	3	30.0	0		0	1	0	0	0	0	0	1	0	200.00	2	0	0	0	0	0	0	1	0	1	4
Babylon...............	4,739	7	17.70	3	42.8	0		0	0	0	0	0	0	0	0	0	....	1	2	0	0	0	2	1	0	0	0	1
Southold..............	7,267	13	18.71	1	7.7	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	3	1	1	5	2
Sag Harbor...........	*3,000	3	12.00	1	33.3	0	0	0	0	0	0	0	0	0	2	0	333.33	0	0	0	0	0	0	0	0	1	0	0
Edgewater............	*10,000	19	22.80	3	15.0	0	0	2	0	0	0	0	0	0	0	0	105.26	3	2	0	1	4	0	3	2	0	0	2
Northfield.............	7,014	15	25.70	2	13.4	0	0	0	0	0	0	0	0	0	5	0	333.33	2	3	0	0	0	0	2	1	0	2	0
Westfield..............	*7,000	6	11.71	3	50.0	0	0	1	1	0	0	0	0	0	0	0	333.33	1	0	0	0	1	0	2	0	0	0	0
YONKERS..............	*22,000	49	26.75	17	34.7	1	0	0	0	0	0	0	0	0	12	0	265.30	14	6	1	2	2	4	2	1	1	1	2
Westchester..........	*6,900	6	10.45	1	16.7	0	0	0	1	0	1	0	0	0	0	0	333.33	2	0	0	0	0	0	2	0	0	0	0
Mount Vernon........	8,000	11	16.50	5	45.5	0	0	0	0	0	0	0	0	0	0	1	....	3	1	0	0	0	0	1	0	1	2	2
Sing Sing.............	*6,500	14	25.84	2	14.3	0	0	0	0	0	0	0	0	0	0	0	....	2	6	0	0	1	1	1	0	0	2	1
New Rochelle........	5,276	15	33.90	3	20.0	0	0	0	0	0	0	0	0	0	0	0	....	1	3	0	1	0	1	2	2	2	1	2
Rest of district......	....	85	....	21	24.7	0	0	1	1	0	0	1	0	0	9	3	176.35	12	14	2	8	5	3	6	2	5	8	10
HUDSON VALLEY DIST:																												
ALBANY...............	*96,000	146	18.25	36	24.7	3	0	14	0	0	0	0	1	2	1	1	150.69	14	23	0	13	12	23	6	3	3	4	23
COHOES...............	*20,000	31	18.60	15	48.4	0	0	2	0	0	0	0	0	2	7	0	351.84	6	7	1	0	0	0	2	0	0	1	3
West Troy.............	*13,000	16	14.77	4	25.0	0	0	2	0	0	0	0	0	0	1	0	187.50	5	3	0	0	2	0	1	1	0	1	0
Hoosick Falls........	*6,000	15	30.00	6	40.0	0	0	0	0	0	0	0	0	0	1	0	66.66	5	1	0	0	3	0	2	0	0	0	3
TROY....................	*60,000	137	27.40	49	35.7	8	0	7	0	0	5	0	0	1	23	8	379.56	23	10	3	6	2	15	13	2	0	5	7
Lansingburgh.........	*9,700	11	13.60	1	9.0	0	0	0	0	0	0	0	0	0	0	0	....	2	7	0	0	1	4	1	0	0	0	1
Green Island.........	*5,000	8	19.20	1	12.5	0	0	0	0	0	0	0	0	0	0	1	125.00	2	4	0	0	1	0	0	0	0	0	0
Greenbush............	*7,200	6	10.00	0	....	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	3	1	0	0	0	0
Coxsackie.............	4,000	8	24.00	1	12.5	0	0	0	0	0	0	0	0	1	0	0	125.00	0	0	0	[illegible]	0	0	0	1	1	4	0

Catskill	*4,600	9	23.48	3	33.3	1	0	0	0	0	0	0	0	0	1	0	222.22	0	0	0	0	0	4	1	0	0	0	2
HUDSON	*10,000	9	10.80	3	33.3	0	0	0	0	0	0	0	0	0	0	0	....	2	2	0	0	0	1	0	0	3	1	0
KINGSTON	*21,100	26	14.78	6	23.0	0	0	0	2	0	0	0	0	0	3	0	192.87	3	1	2	3	2	3	2	1	2	2	0
Wawarsing	8,547	4	5.65	0	......	0	0	1	0	0	0	0	0	0	0	0	250.00	0	0	0	0	1	1	0	0	0	0	1
Rosendale	5,000	3	7.20	0	.....	0	0	1	0	0	0	0	0	0	0	0	333.33	0	0	0	0	0	0	0	0	0	0	2
Marbletown	*4,000	2	12.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	2	0
Saugerties	*4,000	4	12.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	1	2	0
POUGHKEEPSIE	*20,200	27	16.04	12	44.4	0	0	0	0	0	2	0	0	2	3	0	259.25	4	5	0	1	1	2	3	0	1	3	0
Fishkill	10,732	12	13.46	5	41.6	0	0	0	0	0	0	0	0	0	4	1	416.66	1	2	0	0	0	0	0	0	0	1	3
Wappinger Falls	5,000	5	12.00	0	......	1	0	0	1	0	0	0	0	0	0	0	400.00	0	1	0	0	0	0	0	0	0	2	0
NEWBURGH	*20,000	25	15.00	6	24.0	0	0	2	1	0	0	0	0	0	4	0	250.00	3	3	2	0	1	0	5	0	0	4	0
Port Jervis	*9,000	9	12.00	2	22.2	0	0	0	0	0	0	0	0	0	0	0	....	3	3	2	0	0	0	0	0	0	1	0
Middletown	*10,000	17	20.40	1	6.0	0	0	1	0	0	1	0	0	0	0	0	117.70	2	6	0	1	1	0	1	2	1	1	0
Goshen	4,387	6	16.41	1	16.7	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	2	1	0	0	3	0
Haverstraw	*7,000	8	13.71	2	25.0	0	0	0	0	0	0	0	0	0	1	0	125.00	2	4	0	0	0	1	0	0	0	0	0
Nyack	*5,000	12	28.80	7	58.3	0	0	0	0	0	0	0	0	0	7	0	583.33	1	0	0	1	0	0	1	0	0	1	1
Ramapo	5,000	7	16.80	2	28.6	0	0	0	0	0	0	0	0	0	1	0	142.86	1	1	0	1	0	0	0	0	0	2	1
Rest of district	....	129	....	25	20.0	0	0	5	1	0	2	0	1	2	10	2	177.00	14	18	2	9	5	10	9	3	6	24	6
ADIRONDACK & NORTHERN DISTRICT:																												
Argyle	3,700	1	3.25	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Greenwich	3,861	3	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	1	0
Fort Ann	4,267	3	8.40	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	1	0	0	0	0	0	0	1	0
Fort Edward	4,860	1	2.50	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	1	0	0	0	0	0
Queensbury	10,000	11	13.20	3	27.2	0	0	1	0	0	2	0	0	0	0	0	272.72	2	1	0	1	1	0	2	1	0	0	0
Crown Point	4,287	2	5.60	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	1	0	1	0	0
Port Henry	2,525	1	5.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	0	1
Malone	7,908	6	9.12	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	2	0	0	0	1	1
OGDENSBURG	11,000	15	16.36	5	33.3	0	0	0	1	0	0	0	0	0	2	2	333.33	1	2	0	1	0	0	1	0	0	2	3
Gouverneur	5,500	5	10.90	1	20.0	0	0	0	0	0	0	0	0	0	0	0	....	2	1	0	0	0	0	0	0	0	1	1
Ellisburgh	4,812	4	10.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	2	0	0	0	0	0	0	1	1	0
Plattsburgh	7,000	4	7.00	2	50.0	0	0	0	0	0	0	0	0	0	0	1	250.00	1	2	0	0	0	0	0	0	0	0	0
Cape Vincent	3,143	2	8.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	0	0	0	0	0	1	0	0
Clayton	4,214	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	1	0	0	1	0
Rest of district	....	87	....	17	20.0	0	0	1	0	0	0	0	0	1	1	0	84.50	10	13	1	7	2	14	10	2	5	15	5
MOHAWK VAL. DIST.:																												
SCHENECTADY	15,000	21	16.80	4	19.0	0	0	1	0	0	1	0	1	0	1	0	190.00	0	1	0	0	2	4	2	0	0	3	5
Schoharie	3,350	5	18.00	0	......	0	0	1	0	0	0	0	0	0	0	0	200.00	0	1	0	0	0	1	1	0	0	1	0
Middleburgh	3,376	4	14.22	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	0	0	1	0	1	0	1	0	0	0
AMSTERDAM	*14,000	17	14.57	5	30.0	0	0	0	0	0	0	0	0	0	4	0	235.30	5	2	0	0	1	0	2	0	1	2	0
Johnstown	*6,000	4	8.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	1	0	1	0	0	0	1	0
Gloversville	*10,000	8	9.60	1	12.5	0	0	0	0	0	0	0	0	0	1	0	125.00	2	1	0	0	0	1	0	0	0	1	2
Little Falls	7,300	12	19.73	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	4	0	0	0	0	3	2	1	1	1
Ilion	4,200	3	8.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	0	0	0	0	0	0	1	0
UTICA	*39,000	71	21.84	20	28.0	0	0	0	0	0	1	0	0	3	1	1	84.50	7	13	1	9	4	7	11	5	2	2	4
ROME	12,045	20	20.00	3	15.0	0	0	0	1	0	0	0	0	0	0	0	59.00	3	2	0	0	0	1	3	1	0	6	3
Boonville	4,000	6	18.00	0	......	1	0	0	0	0	0	0	0	0	0	0	166.67	2	0	0	0	0	0	0	1	1	1	0
Camden	3,400	1	3.52	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	0	0	0	0	0
Waterford	4,326	7	19.42	1	14.3	0	0	0	0	0	0	0	0	0	1	1	285.72	0	1	0	0	2	0	1	0	1	0	0
Ballston Spa	3,300	9	33.75	5	55.5	0	0	0	1	0	0	0	0	0	1	1	333.33	0	0	0	1	0	1	1	0	0	1	2
Saratoga Springs	10,000	18	21.60	2	11.1	0	0	1	0	0	0	0	0	0	2	0	166.67	0	3	0	1	1	0	4	1	0	3	2
Rest of district	....	95	....	15	15.5	1	0	4	0	0	0	0	0	0	4	2	110.00	9	9	1	6	8	4	6	2	4	27	6

MONTHLY BULLETIN OF THE NEW YORK STATE BOARD OF HEALTH—(*Continued*).

	Population.	Total number of deaths.	Representing annual death-rate per 1,000 of —	Deaths under five years.	Percentage of deaths under five years to total deaths.	Cerebro-spinal fever.	Typhus fever.	Typhoid fever.	Malarial diseases.	Small-pox.	Scarlet fever.	Measles	Erysipelas.	Whooping cough.	Croup and diphtheria.	Diarrhœal diseases.	Zymotic deaths per 1,000 deaths from all causes.	Acute respiratory diseases.	Consumption.	Puerperal diseases.	Diseases of digestive system not diarrhœal)	Diseases of urinary system.	Diseases of circulatory system	Diseases of nervous system.	Cancer	Accidents and violence	Old age.	Unclassified.
SOUTHERN TIER DIST:																												
BINGHAMTON	*23,000	37	19.30	7	18.9	0	0	1	1	0	1	0	0	2	3	0	216.22	4	4	1	0	0	5	1	0	1	2	11
Owego	*6,000	10	20.00	2	20 0	0	0	1	0	0	0	0	0	0	0	0	100.00	0	0	0	1	0	0	3	0	0	2	3
Candor	4,323	2	5.60	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	1	0	0	0
Waverly	3,000	3	12.00	0	......	0	0	0	0	0	0	0	0	0	1	0	....	1	0	0	1	0	0	0	0	0	0	0
ELMIRA	*25,000	28	13.44	8	28.5	0	0	1	0	0	0	0	0	0	3	0	143.00	4	6	2	2	0	2	2	3	0	1	2
Horseheads	3,500	2	7.00	0	......	0	0	1	0	0	0	0	0	0	0	0	500.00	0	0	0	1	0	0	0	0	0	0	0
Bath	*3,500	5	17.15	0	......	0	0	1	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	2	1
JAMESTOWN	*12,000	11	11.00	5	45.5	0	0	1	0	0	0	1	0	0	3	0	545.48	1	1	0	1	0	1	0	0	0	0	1
Rest of district	....	41	....	6	14.6	1	0	2	1	0	0	0	1	0	4	1	219.50	4	7	0	4	1	6	1	0	2	5	2
EAST CENTRAL DIST.																												
Walton	3,541	2	7.00	1	50.0	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	1	0	0
Delhi	3,000	3	12.00	[illegible]	......	0	0	0	0	0	0	0	0	0	0	0	....	1	1	0	1	0	0	0	0	0	0	0
Liberty	3,299	4	15.00	0	......	0	0	1	0	0	0	0	0	0	1	0	500.00	1	0	1	0	0	0	0	0	0	0	0
Oneonta	*5,000	9	21.60	3	33.3	1	0	2	0	0	0	0	0	0	0	1	444.44	1	2	0	0	0	0	0	0	2	0	0
Brookfield	3,685	1	....	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	0	0	0	0	0	1	0
Hamilton	3,912	3	9.00	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	1	0	0	1	0	0	1	0
Skaneateles	4,866	4	10.00	1	25.0	0	0	0	0	0	0	0	0	0	3	0	750.00	0	0	0	0	0	1	0	0	0	0	0
SYRACUSE	*70,000	82	14.05	14	17.0	0	0	1	0	0	0	0	0	2	1	1	61.00	7	20	3	5	2	12	9	4	9	4	2
Geddes	7,000	2	....	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	1	0	0	0	0	0	0	0	0
Cortland	7,361	3	....	0	......	0	0	0	0	0	0	0	0	0	1	0	....	0	0	0	0	0	0	0	0	0	2	0
Rest of district	....	85	....	10	11 9	0	0	5	1	0	0	0	0	0	6	1	176.45	7	14	1	8	2	5	1	2	2	22	6
WEST CENTRAL DIST:																												
AUBURN	*26,000	38	17.54	2	5.3	0	0	0	0	0	0	0	0	0	0	2	52.63	10	6	2	0	4	3	6	1	2	0	2
Ithaca	*10,000	8	9.60	4	50.0	0	0	1	0	0	0	0	0	0	4	0	625 00	0	0	0	0	1	0	0	1	0	0	1
Hector	5,000	2	4.80	0	......	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	1	0	0	0	0	0
Seneca Falls	*6,853	3	5.26	2	66.6	0	0	0	0	0	0	0	0	0	0	0	....	0	0	0	0	1	0	0	0	1	0	1
Manchester	*4,000	3	9.00	2	66.7	0	0	0	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	0	0	0	0	2
Phelps	*7,000	3	5.14	0	......	0	0	1	0	0	0	0	0	0	0	0	....	0	1	0	0	0	0	1	0	0	1	0
Geneva	*6,000	11	22.00	3	27.3	0	0	0	0	0	0	0	0	1	0	0	181.82	2	1	0	0	0	2	0	0	0	4	0
Attica	3,100	7	27.10	1	14.3	0	0	0	1	0	0	0	1	0	0	0	142.85	0	1	0	0	1	0	0	1	2	1	0
Penn Yan	4,500	6	18.34	0	......	0	0	0	0	0	0	0	0	0	0	0	[illegible]	0	1	0	0	1	1	0	0	0	2	0
Le Roy	*3,000	2	8.00	0	......	0	0	0	0	0	0	0	0	0	1	0	500.00	0	0	0	1	0	0	0	0	0	0	0
Rest of district	....	58	....	10	17 2	0	0	3	0	0	1	0	1	0	4	1	172.40	5	8	0	1	1	5	6	2	8	14	1

LAKE ONTARIO AND WESTERN DIST.:																												
OSWEGO	*24,000	21	10.50	2	9.5	0	0	0	0	0	0	0	0	0	2	0	95.24	0	3	0	1	2	1	0	3	3	3	3
Fulton	4,000	5	15.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	1	2	0	0	1	0
Lyons	*6,000	10	20.00	6	60.0	0	0	2	0	0	0	0	0	3	0	1	600.00	1	1	0	1	0	0	0	0	0	1	0
Newark	3,500	2	7.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	0	0
Palmyra	*4,800	6	15.00	3	50.0	0	0	0	0	0	0	0	0	0	0	1	......	0	1	0	0	0	0	1	0	1	1	1
Wolcott	3,753	4	12.80	1	25.0	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	1	0	0	0	2	1
ROCHESTER	*101,000	133	15.80	46	34.5	0	0	3	3	0	2	0	0	0	21	7	273.15	9	17	1	7	4	10	25	7	3	4	10
Brockport	4,500	7	18.67	1	14.3	0	0	0	0	0	0	0	0	0	0	2	285.71	0	1	0	0	1	1	0	0	0	0	1
Greece	*5,000	4	9.60	1	25.0	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	0	0	1	0	1	1
Mendon	3,200	5	18.75	2	40.0	0	0	0	0	0	0	0	0	0	0	0	......	0	1	0	0	0	0	0	0	0	3	1
Brighton	3,736	4	13.00	1	25.0	0	0	0	0	0	0	0	0	0	0	0	......	1	0	0	0	0	0	1	0	0	2	0
Albion	*5,000	2	4.80	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	1	0	0	0	0	0	1	0
LOCKPORT	*15,000	13	10.40	5	38.5	0	0	0	0	0	0	0	0	0	0	1	77.77	3	1	0	2	0	0	1	0	1	2	2
BUFFALO	*202,818	†292	18.77	127	43.5	4	0	3	4	0	8	0	1	0	37	8	219.00	34	30	3	17	10	17	42	3	11	12	48
Tonawanda	4,900	6	14.70	1	16.7	0	0	0	0	0	0	0	0	1	1	0	333.33	0	1	0	1	0	1	0	0	0	0	1
Aurora	*3,000	1	4.00	0	......	0	0	0	0	0	0	0	0	0	0	0	......	0	0	0	0	0	0	0	0	0	1	0
Rest of district	......	64	......	12	18.8	0	0	3	1	0	0	0	0	0	2	2	125.00	2	13	0	4	1	6	6	3	2	14	5
Totals for the State	..	6,872	....	2,423	35 2	47	2	157	98	1	68	155	18	49	675	166	.....	1,056	982	70	328	361	448	576	166	264	494	661

† For four weeks ending November twenty-seven

REMARKS — The total reported mortality for November is 6,872, of which 35 2 per cent were under the age of five years. From Zymotic diseases there were 1,466 deaths, a ratio of 213.33 per 1,000 mortality. From Diarrhœal diseases, the ratio per 1,000 is 24 15, from Typhoid fever, 22.85; from Croup and Diphtheria, 98.22; from Consumption the ratio of mortality is 142.90 per 1,000, and 220.66 per 1,000 above the age of five years. The combined death ratio per1,000 from Zymotic diseases, Consumption and Puerperal diseases, is 366.41. A case of Small-pox occurred in Yonkers in November, Measles prevails largely in the same place. From Acute Respiratory diseases there were 153.66 deaths per 1,000 total mortality. For the preceding month, 250 delayed returns have been received, especially from Hempstead, Newark, Mount Vernon, Flushing, Esopus, Babylon and Waterford; the total mortality for October to this time is 7,[illegible]0. Four additional death returns have been received from Seneca Falls for November, and five from Groton.

SCHOOL HYGIENE.

REPORT

ON THE

CONDITION OF THE PUBLIC SCHOOLS THROUGHOUT THE STATE.

The school-houses of the State, though long regarded as needing attention, have not hitherto been investigated to any great extent. Although in 1881 an expert was employed by the Board to look into this matter and prepare a report thereon, which he did with signal ability, yet the schools visited were few and principally in the larger cities, so that the country school-house still remained a comparatively *terra incognita*.

After carefully considering the best means of aiding a sanitary reform in school-houses, it was decided that inasmuch as the essentials in the matter of heating, lighting, ventilation, etc., had been fully discussed in its former report, and widely distributed, with suitable illustrations, before any further intelligent advance could be effected, definite information concerning the present condition of the country schools must be had on which the Board could act·

The Board, therefore, on the 31st of August, 1886, resolved that an inquiry of this character be ordered and the results published in its annual report.

A circular covering salient points was prepared and addressed to the health officers of the various boards of health throughout the State, to which answers were requested, the aim being to get returns from each health organization concerning the sanitary condition of the schools within their respective jurisdictions.

The co-operation of the Superintendent of Public Instruction was also sought to obviate any possible conflict between the educational and health authorities. Superintendent Draper was heartly in sympathy with the undertaking, and promised, so far as lay in his power, to second the Board's efforts to remove any insanitary conditions found by the investigation to exist.

The returns received from the boards of health have been tabulated and are printed herewith. The remarks given in the last column are, as far as possible, reproduced in the words of the health officer, with a view of the better reflecting the feeling of the

locality. A study of the tabulation, which is as full as could be secured in the brief space of time at the disposal of the office, will afford a pretty correct index to the real conditions existing.

VENTILATION.

The air space *per capita* it will be seen varies considerably, being as low as twenty-seven cubic feet, which would make a partition two feet long, two feet broad and say seven feet high (and which it is thought must be incorrectly reported), and as high as 1008 cubic feet, which would represent a room ten feet long, ten feet broad and ten feet high.

A few school-rooms were reported as having less than 100 cubic feet *per capita*; a large number with less than 200, while those with 300 or over were comparatively rare. A number were so reported that the *per capita* air space could not be calculated; but the other conditions stated were so unsatisfactory as to make it more than probable that defects of a grave character exist there also.

Considering that scarcely any means of ventilation are provided other than lowering the windows, in the majority of these country schools, and bearing in mind that in a school-room the minimum allowance of fresh air per scholar should be thirty cubic feet per minute, the fresh air held in a space of 300 cubic feet would be defiled in ten minutes, and an entire change of air should be effected in the room six times an hour to bring it within the limits of healthy respiration. If this is true of a school-room allowing 300 cubic feet *per capita*, what shall be said of schools with less than that allotment and even less than 200 cubic feet? Is it likely that there will be an entire change of air in the rooms every five minutes? and yet this is what would be called for under the circumstances. But such a change could not be effected without exposing children to dangerous drafts. The evil, however, is probably modified by keeping certain windows open most of the time by various contrivances. But, however this may be, there can be no doubt that the general condition of the average country school-house in respect to ventilation is bad. The health officers seem to be fully cognizant of this and call for radical improvement. One goes so far as to characterize it as "simply terrible, that the atmosphere was not fit for a dumb animal to breathe or inhale." Another declares it "a disgrace to a community of Choctaws."

HEATING.

The majority of the schools were heated by stoves, some burning wood others coal. Only a limited number were found having furnace or steam heat. Few of the stoves were jacketed, and usually the temperature maintained was found to be little short of roasting. With the foul air that these rooms contained by reason of their

utter lack of proper ventilation and their overcrowding, heated to such a temperature, the task of acquiring knowledge requiring a mental effort must be difficult indeed, and the expectation that a teacher under such circumstances could display any enthusiasm in the work or awaken any in the pupils, would seem to be unwarranted.

DRAINAGE.

A perusal of the table will make evident that, in general, little care is exercised in the selection of a good site for the building or in securing that it rests upon a dry foundation. Many of the schools were damp and without any drains, others had drains leading to closed cesspools, with nothing to prevent the entrance of the unhealthy gases from the cesspools into the buildings. This it is needless to say, can easily be obviated and should not be allowed to exist.

The evils of soil saturation and its tendency to enfeeble health are too well known to need repeating in this connection.

As already indicated in the sixth report of this Board, "the science of drainage is now so generally understood that it cannot be necessary to have a 'wet cellar,' except in rare cases, and in such cases the site should not be used. In damp sites the flow of underground water toward the cellar may be intercepted by a trench containing drain tile outside the foundation, sunk somewhat lower than the level of the cellar floor, the drain communicates with pipes which lead the water elsewhere. Solid cellar-walls coated outside with coal tar may be used. Good asphalt flooring is desirable; common brick is not only liable to be damp, but often grinds to dust under the feet. A trench cut across the floor and communicating with the outer drains will take off the water under the floor. Such a trench may be filled with common stones and be covered over."

CLOSETS.

With few exceptions the conveniences provided for the pupils were the midden or privy. Occasionally earth closets were used, but most generally the common vault. The condition of these vaults as described by the health officers was simply disgusting. As this Board has repeatedly stated, the privy vault is an abomination which should be utterly abolished in this enlightened age. It pollutes the soil, the ground water and the air of its vicinity. The manurial value of its contents is undoubted, and by means of earth closets all this value can be preserved without the offensiveness and mischief at present engendered. So disgusting are the arrangements in reference to closets that in one instance a health officer says the building is "hardly suitable for a swine-pen in winter."

LIGHTING.

In regard to arrangements for lighting all kinds of provisions have been found; light from both sides; light from one side; light from back; light from front; light from front and back; light from front and sides; light from back and sides; from front and one side; from back and one side; from side, front and back; from two sides, front and back. The ideal school should have light from one side only, and that preferably from the left. Comparatively few were found which met this requirement, quite a number having the light from the front, and some where the light came from all points of the compass. The injury to the eyes of pupils resulting from such faulty arrangements may well be imagined.

PRESENT NEEDS.

We pass over the answers given in reference to duration of school-hours, recesses, etc., and note a few of the suggestions made by the health officers as to the needs of the several schools.

They cover it will be seen almost everything; location, building, drainage, condition of closets, ventilation, heating, lighting and school furnishing.

One complaining of the site says: "The locality is bad. School situated on low ground with a pool of stagnant water in front of building which gets the drainage from several privy vaults and stables."

Another says: "A new school-house with proper desks is needed. The building is in no way adapted for present purpose. Small pupils cannot touch the floor with their feet. A disgrace to the town."

Another wants the building abolished and a new one erected conforming to requirements of sanitary science, the present structure being in a bad and dangerous state of decay.

Yet another, evidently in a spirit of indignation, writes: "Burn the old shell down and build something decent."

Another claims "the building needs a thorough overhauling. It is a great source of colds and kindred diseases. It could not be in a worse condition."

Still another says "the roof is very poor and leaky; sills rotted; floors very poor and worn through." While one who seems to regard the present condition of things as hopeless, writes: "We need everything all through; building in bad shape; closets but nineteen feet from hall door; should be removed; closet doors off their hinges; seats unprotected; boards torn from floor and cleanliness unknown. As for ventilation, practically there is none. Can you wonder that mothers tell me their children have so much headaches when they attend school?"

Then the lack of ventilation is complained of, for instance:

"Scientific ventilation and heating by furnaces, new and more roomy buildings needed."

"We lack ventilation and have too many pupils in rooms; many have headaches and are often ill."

"Nearly every month during winter I am called upon to treat catarrh of various forms, that I think the children contract by deficient ventilation."

"Provide breathing room."

"The pressing need in our school-houses is one of ventilation; they are particularly bad in that respect; doors and windows are tightly closed in cold weather without any means for admitting fresh air or driving out that which has been rendered impure."

"The great want is better ventilation; severe sickness has not infrequently occurred from neglect on this point. An overcrowded room, and overheated stove and a broadly open window are of frequent occurrence."

As regards the condition of the closets the outcry is equally significant, for example:

"No care taken to keep closets clean."

"New closets greatly needed."

"Several closets in the vicinity have no drainage and at times emit a terribly offensive odor."

"The arrangement of closets is also very bad; in more than half the cases both sexes using the same closet. Every school-house should be provided with a separate privy for each of the sexes, and should be cleaned thoroughly at least twice a year."

"Closet twenty-five feet from building; not cleaned in a number of years; facing the closet are four windows and one of the main doors."

"A new closet needed, as the sexes are not at all isolated."

"Only one privy for ninety-four pupils and no drainage."

Then there are other complaints more or less serious. Several are troubled with water standing in cellar; one has no well, and obliged to go to a neighbor's; desks are too high for small pupils; narrow benches without backs; light defective in a great many, and one health officer writes that no improvement has been made in the school in forty years.

Finally one, apparently despairing of getting relief from local authorities, writes: "The State Board of Health should secure legislation which will make it obligatory upon on all school districts to provide buildings which shall furnish sufficient air-space for the

pupils with proper lighting, ventilation and heating. These matters should no longer be left for performance to the caprice of the inhabitants of a school district."

RECAPITULATION.

The more this subject is considered the more evident it becomes that there is need of legislation of a somewhat stringent character; for after two very large editions of an exhaustive report on school hygiene having been distributed throughout the country, covering all the information necessary in order to determine what a school required in a sanitary point of view, after much personal effort and many years waiting it is found that the school authorities will not do anything involving expense unless they are obliged to by an imperative law.

The same conclusion seems to have been arrived at by the Superintendent of Public Instruction, who, anxious to bring about an amelioration of existing conditions, has addressed to this office a letter asking what the State Board regarded as essentials to be insisted on in all the schools of the State with a view of embodying them in the form of an act to be presented to the present legislature.

"It is my purpose," he writes, "to ask for such legislation at the approaching session of the legislature, as will enable and require boards of education and trustees to remedy the existing evils. Experience has proved that this can only be accomplished by extreme measures such as should be invoked only to suppress extreme evils."

As recommended to Superintendent Draper, the following requirements are held to be essential to the sanitary welfare of the school children of the State:

1. Building should rest on a good dry foundation, and be constructed to insure the comfort of children during inclement weather.

2. Class-rooms should be arranged so as to admit light from left side and back of pupils, and the area of windows should be one-fourth of floor space.

3. Not less than 250 cubic feet of air space should be allowed per pupil, and provision for changing air should be made so as to secure each pupil not less than thirty cubic feet of fresh air per minute.

4. The temperature of the school-rooms should, in winter, be maintained at a range not to exceed from sixty-eight degrees Fahrenheit to seventy degrees Fahrenheit.

5. Closets should be provided for each sex, entirely separate from each other and having entirely separate means of access. When situated ouside the building they should be about fifty feet distant

and should be connected with it by a covered walk. Privy vaults should be utterly abolished. Movable boxes or buckets should be placed under the seats and earth or ashes provided as a deodorant. Buckets should be cleaned out at least once a week.

6. In addition to his other legal powers over schools, the Superintendent of Public Instruction should have authority to oblige school trustees to make improvements or repairs in school buildings for sanitary purposes, whenever the local board of health considers such necessary and their judgment is supported by that of the State Board of Health.

SANITARY CONDITION OF SCHOOL-HOUSES.

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Catskill	Brick	....	10,319	40	257	Privy; good	Chimney flues	Steam.
Ancram	Frame	2	6,000	22	272	Privy	By windows	Stoves.
Kinderhook	Frame	2	2,500	24	109	Closets; good drain	Windows mainly	Stoves.
Berne, Albany county	Fair	1	....	....	....	Closets; fair drainage for place.	Windows	Wood stove.
Alfred Centre	Brick veneered	4	9,062	37	245	Stone drains underneath.	Ruttan-Smead system.	Hot air.
Hudson	Brick	23	....	....	....	....	....	....
Schenevus	Wood	5	10,280	36	285	Drainage good; privy	Windows, aided by flues.	Stoves.
Milford	Wood	3	11,360	35	324	Drainage good	Windows	Stoves, coal.
Ballston Spa	Brick; good	15	7,000	40	175	Drains to creek; vaults	Ventilating shafts	Hot air and steam.
Accord	Frame	2	6,000	20	300	Drainage good; privy	Ventilator in ceiling.	Coal stoves.
Riverhead	Frame.	6	6,240	52	120	No drain; open closets	Windows	Steam.
Hammond	Frame.	2	9,715	36	242	Drainage good; privy	Windows	Wood stoves.
1. Pulaski	"Nondescript"	1	9,869	30	329	Vaults done in water lime; matter allowed to accumulate for 6 months; then it is carted away.	Windows; 4 in each room; size 3 feet by 5 feet.	Wood stoves.
2. Pulaski	....	4	8,611	45	191			Wood stoves.
Cayuta	Frame	1	11,648	40	291	Common privy	Windows	Box stove.
Tarrytown	Good	6	10,200	47	217	Drains to street; closets good and in good condition.	Ventilating flues in chimneys.	Furnaces in basement and cellar.
Clarksville	Good repair; tolerably convenient.	2	5,170	27	191	Excellent drainage; closets clean and in good repair.	By registers in ceiling.	Stoves.
Perry District No. 1	Unfit for pupils; very poor.	1	7,000	29	241	No drainage; closets unfit.	Windows only	Wood stove.
Perry Centre Dist. No. 3	Good	1	5,250	30	175	Good drainage; very poor closets.	Windows only	Wood stove.
Perry District No. 4	Poor; not decent for school.	1	2,430	25	97	No drainage; new closets.	Windows only	Wood stove.
Perry District No. 5	Very good	1	4,725	32	148*	Drainage good; fair closets.	Windows only	Stove.
Perry Centre Dist. No. 7	Good	1	6,750	28	241	Fair drainage; closets good.	Windows only	Wood stove.
Perry Centre Dist. No. 8	Good	2	9,975	45	222	Fair drainage; good	Windows only	2 wood stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Catskill	With backs to window	4¾	None	Yes	Excellent conditions.
Ancram	Backs, and 1 side to windows.	6	Yes	Yes	Conditions as good as funds permit.
Kinderkook	Side and front to window.	6	Yes	Yes	Does not include village.
Berne, Albany county	Side to window	6	Yes	Yes	Recommends coal instead of wood, and ventilating flues.
Alfred Centre	Back and left to window.	6	Yes	Yes	School building new.
Hudson					
Schenevus	Backs and sides to window.	5½	Only in 2 class rooms.	Yes	More room and better ventilation needed.
Milford	Light on 3 sides	6	Yes	Yes.	
Ballston Spa	Light from side and back.	4.50	Only to the lower grades.	Yes.	
Accord	Good	6	Yes	Yes.	
Riverhead	Side, front and rear.	6.40	Yes	Yes	More rooms needed.
Hammond	From sides	6	Yes	Yes.	
1. Pulaski. / 2. Pulaski.	So arranged that pupils receive a direct "cross light."	5½ hours part of the year, and 4 hours 40 min. other part.	Yes; short recesses.	Yes	State authorities should have local authorities enforce hygienic laws; large school has 2 large privy vaults 8 feet from rear of building.
Cayuta	Light from all sides; 2 windows on each of 4 sides.	5	Yes	Yes	Ventilation and bad light complained of. Can cross-light be remedied, and how?
Tarrytown	Nearly all pupils with side or back to light; few face light.	4¾	None	Yes.	
Clarksville	Light from rear and sides.	6	Yes	Yes	Could be improved by finishing room overhead for 1 department, and turning both rooms below into one.
Perry District No. 1	Very fair	6	Yes	Yes	A complete new outfit of buildings, etc., needed.
Perry Centre Dist No. 3	Fair	6	Yes	Yes	New closets needed.
Perry District No. 4		Not given	Yes	Yes	New school-house needed.
Perry District No. 5	Very fair	6	Yes	Yes.	
Perry Centre Dist. No. 7.	Light from sides and back	6	Yes	Yes.	
Perry Centre Dist. No. 8	Fair	6	Yes	Yes.	

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*)

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
James St. School, Rome..	Brick............	3, and with 2 for recitations.	7,938 3/8	88 3/8	89†	Cesspools, closets about 20 feet from building; vaults.	By doors and windows.	By stoves.
Jay St. School, Rome.....	Brick; new.......	3, and with 2 for recitations.	12,038 3/8	73 3/8	163†	Cesspool, closet, vaults, about 15 feet from building.	By flues, kept warm by smoke-pipe.	Hot air furnaces.
So. James St. School, Rome	Frame...........	1, and with 1 for recitations.	6,860	110	62†	Cesspool, closets, 60 feet from building; vaults.	By doors and windows.	Stoves
West Rome School, Rome.	Frame...........	1	15,400	50	308	Surface drainage; closets 30 feet from building; vaults.	By opening in ceiling, doors and windows.	Stove.
Rome Academy	Brick; in good condition.	1 study room.... Primary in basement.	30,996 10,600	150 65	206† 163†	Cesspool, closets 40 feet from building; over vaults.	By doors and windows.	Hot air furnaces in basement.
Liberty St. School, Rome.	Brick; in fair repair.	4, and with 4 for recitations.	16,128	92½	174†	Cesspools, closets over vaults about 30 feet from building.	By doors, and windows.	By stoves.
Maine Village...........	In good condition.	2	4,650	30	155	Not answered...........	By door and windows.	Wood stoves.
Delhi..................	Good............	2	14,400	47⅛	306†	Drainage none; closets good.	By latest method....	Furnace.
Dobb's Ferry............	Brick...........	7	6,100	36	169†	Well drained; closets are detached.	By windows.........	Hot air.
Hyndsville..............	Frame...........	1	987⅛	34⅛	27†	Open drainage..........	By deep windows....	Coal stove.
Williamson..............	Brick...........	3	10,400	81⅞	338†	Drainage good: closets fair.	By windows..... ...	By two coal stoves.
Locke..................	Frame..........	2	8,295⅝	31	267†	Good; closets separate..	By windows.........	Wood stoves.
Canaan Four Corners.....	Frame.......	2	9,384	35	268†	Outside about 50 feet from school building.	Ventilator in chimney.	By stoves.
Pleasant Valley.........	Wood...........	1	5,175	41	126†	No drainage; closets of wood, back of building.	No ventilation excepting windows.	Coal stove.
Floyd..................	Frame...........	1	4,000	24	166†	School-houses built on ordinary slope of ground; ordinary closets.	By doors and windows.	Wo'd box stoves
Marathon...............	Wooden..........	5	12,286.8	40.6	300†	Drainage good except in flood time; closets wooden 6 rods away.	By windows only....	Coal stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Perry Centre Dist. No. 9	Light from each side	6	Yes	Yes.	
Perry Centre Dist. No. 10	Light from each side	6	Yes	Yes	New and better arranged closets needed.
Woodstock	Light, fair; side view	6	Yes	Yes	Another room needed; sometimes there are over 50 pupils and they have to be crowded in.
Tyre	Between the windows	6	Yes	Yes.	
Gorham Village	With back and sides to windows.	6	Yes	Yes	Proper and continuous ventilation, and maintenance of proper temperature needed.
Schaghticoke	Light from both sides	5	None	Yes	None given.
Belfast	Light from side and back.	6	Yes	Yes.	
Ashford	Very good for side lights.	6	Yes	Yes	Ventilation not sufficient for seating capacity.
Fleming	Side light	6	Yes	Yes	Poorly ventilated and needs new seats.
Seneca Falls	Windows at back and left-hand side light.	4 have hours, and 1 has 5 hrs.	In all but one	Yes	In the Catholic school they have glass partitions which I would change.
Sharon Spa	Light strikes from back and left side.	4¾	None	Yes	Well warmed, ventilated, lighted and drained.
So. Glens Falls	Windows on 3 sides; light from back, front and 1 side.	9 A. M. to 4 P. M., 7 hours.	Yes	Yes	Thorough repairing of water-closets; a good cleaning and a free use of disinfectants needed.
North Norwich	Properly	6	Yes	If needful, I presume.	Was constructed last year, and is as good as district would allow.
Cutchogue	4 windows on each side of room; seats lengthwise.	6	Yes	Yes	One of the best of its class.
Candor	Light from rear and side.	6	Yes	Yes	Substitution of steam for coal stoves would be an improvement.
Portland	Windows at back and side.	6	Yes	If necessary.	

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Green Island	Brick; in good order.	8 in No. 1; 6 in No. 2.	7,200	45	160	Closets located in gravel-beds; excellent drainage.	By shafts from floor to roof in each room.	No. 1 by heaters; No. 2 by steam coils.
Parishville Village	Brick	8	10,080	40	252	No drainage needed, closets in good repair and well cleaned.	Badly; only by small hole in the garret in each room.	By box stove in each room.
Waterford	3 brick	No. 1, 12 rooms; No. 2, 4 rooms; No. 3, 1 room.	4,500	40	112†	Generally good	By doors and windows, and by boards separating window sashes.	No. 3, stove; Nos. 1 and 2, hot air furnaces.
Mohawk	Brick; and in good repair.	6	47,826¾	35⅝	223†	No drainage, vault closets.	By ventilating flue in chimney and windows.	Hot air furnace.
Victory	Frame	2	7,560	25	302†	Wood building on a bank about 6 rods from school-house.	By windows	By coal.
Coeymans Landing	Wood	2	14,400	48½	297	Surface drainage; closets each 4x8, double.	Natural ventilation; outlets and inlets in wall and windows.	By stoves.
West Walworth	Frame; good	1	7,744	42½	182†	Good drainage; 2 closets away from building.	By windows	One stove.
Middlesex	Brick and wood	2	10,608	35	303†	Drainage good; closets 10 rods from school-room.	By doors and windows.	Wood stoves.
Seneca Falls	All very good	No. 1, 8; No. 2, 4; No. 3, 4; No. 4, 7	7,000	35	200	Good drainage; 3 of the closets poor.	3 by window and door; 1 by Ruttan-Smead.	1 by Ruttan-Smead; 3 by stoves.
Cornwall-on-Hudson	Brick	4	8,670	65	133†	Gravel soil; 2 large earth closets cleaned monthly.	Ventilating flues in chimneys, slat fitted under lower sashes	Wood stoves.
Pawling	Commodious and in good repair.	2	10,080 5,040	40 35	252 144	Drainage natural, good; closets, commodious and cleanly.	By windows	Coal stove in each room.
Corfu	Wooden	3	1. 17,172 2. 7,452 3. 9,720	31 40 40	554 186† 243	Cellar drained into sewer; closets with drawers often emptied.	By ventilators in the wall into the open space between siding and plastering.	By stoves.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Upper Red Hook....	Light from both sides...	6	Yes.......	Yes............	It is suggested that a door be cut to connect the cloak-room with main school-room.
Golden..................	Light from back and sides and shaded by white cotton.	5½	None.......	Yes............	When complete the ground is to descend from the house in all directions to prevent standing water.
Sackett's Harbor.........	Side light..............	6	Yes........	Yes............	None given.
Cayuga..................	Windows at back and sides of scholars.	5½	Yes.............	Yes............	None given.
Suspension Bridge No. 2..	Facing windows; windows in back also.	5¾	Yes...	Yes............	More light and better ventilation needed; think 50 pupils too many for cubic dimensions.
Black River.............	Windows on side of seats.	6	Yes.............	Yes.......... ..	None given.
Evan's Mills....	Windows back and on side of seats.	5½	Yes......	Yes............	None given.
Luzerne............. ...	Plenty of light...... ...	6	Yes.............	Yes.......... ..	The school-house is not large enough.
Stillwater........... ..	Seats arranged with backs to windows.	5	None..	Yes..	Windows opened once an hour, and pupils exercised; site of building good; closets about 100 yards from building.
Ludlowville.............	Light comes at side of seats; no light behind.	6	Yes.......	Yes............	We need another room and another teacher.
Port Chester......... ...	Arranged so that light falls over left shoulder.	5	None.......	Yes............	Building nearly new; the closets will be connected with sewers when laid.
Prattsville..............	Side light mainly........	6	Yes.............	Yes............	None given.
Newfane......	Windows on north and south sides.	6	Yes..	Yes..	Swamp water stands in the school-house yard 6 months of the year.
East Rome School, Rome.	1 room lighted on left side; 2d room lighted on right side.	4¾	None......	Yes............	None given.
Thomas St. School, Rome.	1 lighted from right and left, other 2 from left side.	4¾	None..	Yes............	Heated by hot air or steam with proper device for ventilation would be an improvement.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*)

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
James St. School, Rome..	Brick............	3, and with 2 for recitations.	7,938⅜	88⅝	89†	Cesspools, closets about 20 feet from building; vaults.	By doors and windows.	By stoves.
Jay St. School, Rome.....	Brick; new.......	3, and with 2 for recitations.	12,038⅜	73⅝	163†	Cesspool, closet, vaults, about 15 feet from building.	By flues, kept warm by smoke-pipe.	Hot air furnaces.
So.James St.School, Rome	Frame	1, and with 1 for recitations.	6,860	110	62†	Cesspool, closets, 60 feet from building; vaults.	By doors and windows.	Stoves
West Rome School, Rome.	Frame	1	15,400	50	308	Surface drainage; closets 30 feet from building; vaults.	By opening in ceiling, doors and windows.	Stove.
Rome Academy	Brick; in good condition.	1 study room.... Primary in basement.	30,996 10,600	150 65	206† 163†	Cesspool, closets 40 feet from building; over vaults.	By doors and windows.	Hot air furnaces in basement.
Liberty St. School, Rome.	Brick; in fair repair.	4, and with 4 for recitations.	16,128	99⅛	174†	Cesspools, closets over vaults about 30 feet from building.	By doors, and windows.	By stoves.
Maine Village...........	In good condition.	2	4,650	30	155	Not answered..........	By door and windows.	Wood stoves.
Delhi......	Good............	2	14,400	47⅛	303†	Drainage none; closets good.	By latest method....	Furnace.
Dobb's Ferry...........	Brick	7	6,100	36	169†	Well drained; closets are detached.	By windows.........	Hot air.
Hyndsville.............	Frame	1	937⅛	34⅛	27†	Open drainage..........	By deep windows....	Coal stove.
Williamson.............	Brick	3	10,400	31⅞	326†	Drainage good: closets fair.	By windows..... ...	By two coal stoves.
Locke..................	Frame	2	8,235⅝	31	267†	Good; closets separate..	By windows.	Wood stoves.
Canaan Four Corners.....	Frame	2	9,334	35	266†	Outside about 50 feet from school building.	Ventilator in chimney.	By stoves.
Pleasant Valley	Wood............	1	5,175	41	126†	No drainage; closets of wood, back of building.	No ventilation excepting windows.	Coal stove.
Floyd............	Frame	1	4,000	24	166†	School-houses built on ordinary slope of ground; ordinary closets.	By doors and windows.	Wo'd box stoves
Marathon	Wooden..........	5	12,266.8	40.6	300†	Drainage good except in flood time; closets wooden 6 rods away.	By windows only....	Coal stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
James St. School, Rome..	1 lighted from right and left, other 2 from right side.	4¾	None...........	Yes.............	Pupils pass to recitation rooms for lessons; better methods of heating and ventilating would improve school.
Jay St. School. Rome	1 lighted from right and left, other 2 from left side.	4¾	None...........	Yes.............	Hygienic conditions are all that can be desired; pupils pass to recitation rooms.
So.James St.School,Rome	Lighted from rear and left.	4¾	None...........	Yes.........	Building is hardly suitable for school purposes; was dwelling bought to relieve crowd in James street school.
West Rome School, Rome.	Light enters from right and left sides.	4¾	None......	Yes.............	None given.
Rome Academy	No windows in the front; windows to right, left and rear.	4¾	None........ ...	Yes.............	Better ventilation suggested; academy has 6 rooms to which pupils are sent to recite; average cubic dimensions of each 8,992¼ cubic feet.
Liberty St. School, Rome.	2 lighted from rear and right side and 2 from rear and left.	4¾	None.......	Yes.............	Better means of ventilation suggested; there is a steep, narrow stairway, which, in case of fire, would prove dangerous.
Maine Village............	Light from back and sides.	6	Yes.............	Yes.............	Different ventilation suggested.
Delhi....	Lighted on sides; seats face the end.	6	Yes........ ...	Yes.	
Dobb's Ferry..	Light generally over the shoulder.	5	Yes.............	When necessary.	It is a pleasant and substantial building; the closets are regularly and thoroughly disinfected.
Hyndsville................	Seats arranged so light comes from sides.	8	Yes...	If necessary.....	Ventilation not very good; drainage ought to be deeper and covered.
Williamson	Light comes from the sides.	6	Yes.....	When necessary.	I suggest a jacket for the stoves with pipes to bring in warm pure air and others to carry off foul air.
Locke	Light from side.	6	Yes...	Yes.....	The building is nearly new and I presume the district would object to any alterations.
Canaan Four Corners.....	Light over back and left shoulder.	6	Yes..	Sometimes... ...	The building is new and has all the improvements for light and ventilation.
Pleasant Valley	3 windows on each side; seats facing the ends.	9 A. M. to 4 P. M., 7	Yes..	Yes.............	More room and light needed; teacher complains of insufficient light and bad ventilation.
Floyd....	Seats side to light.	6	Yes..	Yes............	School-houses well kept in repair; only improvement suggested is new school-house with thorough hygienic system.
Marathon	From rear in 2 rooms; from rear and side in 3 rooms.	6	Yes......	When thought necessary.	In time of flood water stands in cellar.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued.*)

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Lodi	Frame	2	9,840	54½	180+	Surface drainage; privies on a side hill in good condition.	Poorly	Coal stoves.
Andover	Good	5	11,868	45	263+	Vaults and in good condition.	By extra flues each side of chimney, from basement to top of chimney, also ceiling.	By wood fires.
Oak Hill	Brick	1	8,976	28	320+	Steep descent from school-house on 2 sides; drainage of closets good.	Aided by board placed under lower sash; by windows.	By 2 wood stoves, 1 at each end of room.
Richmond Valley	Frame; in good repair.	1	8,640	44	196+	Closets separate for sexes; cleansed from below by washings of tide water.	By 5 windows and a scuttle-hole in the ceiling.	1 large coal stove.
Huguenot	Wood	1	8,200	40	205	Drainage good; character of closets fair.	By windows	By stove.
Green Ridge	In good order	1	5,580	40	139+	Character of closets fair.	By windows and 1 trap door over teacher's desk.	By coal stove.
Rossville	Frame	1	14,112	55	256+	Built of boards; no drainage; emptied by hand; needs inspection.	By windows	By stove.
Tottenville	Brick	6	10,485 1-6	42 2-6	247+	Good	By fresh air flues in middle of building, opening at top and bottom of rooms.	By furnaces.
Pleasant Plains		3	5,456⅔	38	143+	Have 5 closets	By windows	By stoves.
Eltingville	Frame	1	10,241	50	204+	Good; school stands on elevation; closets 50 feet away and below.	Two ventilators in ceiling; nine windows.	1 self-feeding stove.
Kreischerville	Frame; 1 story	2	14,400	60	240	Best of drainage; closets A 1.	Both transom and register ventilators.	Hot air furnaces.
Lorraine	Bad shape	1	5,000	30	166+	Drainage good; closets bad shape.	9 by 12 glass; 1 light in each department.	Stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Lodi	Poor	6	Yes	Yes.	
Andover	Where light is direct curtains are used to soften rays.	6	Yes	Yes.	
Oak Hill	Windows all around school, 9 in number; blinds closed on sides when sun shines in.	6	Yes	Yes	The method of heating prevents an even temperature being maintained, but generally keep 70° Fah. by thermometer; closets are kept in excellent condition.
Richmond Valley	Light falls from behind and from the sides.	6	Yes	When they wish.	No improvement can be made under existing conditions; the school-house is in good condition and comfortable.
Huguenot	The seats are very well arranged to receive the light from the windows.	9 to 12. 12.30 to 3. 5½	Yes	Yes	None given.
Green Ridge	Windows on sides and front; scholars face the back.	5¾	Yes	As often as necessary.	The desks now in use are very hard on back and eyes.
Rossville	At right angles to windows.	5½	Yes	Yes	Would be an improvement to grade grounds; no well, obliged to use neighbor's; cistern in bad condition; ordered children not to drink from it.
Tottenville	Seats arranged so that light comes at the side of the pupil.	5¼	In the forenoon	Yes	More room for primary department suggested; smaller pupils excused at 2.30 and 3.
Pleasant Plains			Yes		
Eltingville	Windows on all sides; seats face east.	5	Yes	Yes	Pupils have two intermissions of 15 minutes each.
Kreischerville	All light received from 1 side of room and received on left side of desks.	5½	Yes; 2 of 15 min.	Yes	No suggestions for improvement offered; the present school, which is a gift, is far beyond that provided for by district.
Lorraine	Light on east, west, and south.	6	Yes	Yes	Trustee ought to fix as to ventilation.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Livingston	In good condition	1	8,000	40	200	Surface drainage; closets in good condition.	By windows	By stove.
Tuckahoe	Both in good repair.	4 in No. 1; 2 in No. 2.	7,800	38	205†	Drainage by means of drains dug from cellars; closets in good repair and recently cleaned.	By windows and flues.	By furnaces.
Castleton, Rensselaer Co.	Brick	4	10,800	50	216	Brick vaults; no drainage.	By windows	By 4 stoves.
New Paltz	Brick	2	16,200	63	257†	Drainage good; closets in good condition.	By doors and windows.	Coal stoves.
Monsey	Frame; fair condition.	1	12,936	35	369†	Drainage from building; ordinary privies which are cleansed occasionally.	By windows by an opening through ceiling into space between ceiling and roof.	By 1 large coal stove.
North Clove		1	8,250	20	412†	No drainage; 2 privies or closets; one for each sex.	No arrangement made for ventilation, but has windows; built 20 years.	Coal stove, pipe passing nearly length of the room.
New Utrecht	New and good	2	10,400	40	260	Good	By chimney	Furnace.
Springwater	Modern wooden	2	10,976	35	313†	No drainage; bad	Ventilator	Stoves.
Brasher Falls	Frame	1	7,488	27	277†	Wooden closets; no drainage, but built on a dry elevation.	Through chimney with register near floor, also pipe near floor for entrance of cool air.	Stove.
Campbell Hall	Good	1	9,075	19	477†	Good	Well	Coal stove.
Russell	Stone	2	10,764	30	358†	No special drainage; closets separate from school building.	No special ventilation.	Wood stoves.
Rhinebeck	Brick	5	12,400	30	413†	Pit; covered with good buildings.	Registers and openings in walls near ceiling, also between upper and lower sash.	Furnaces in cellar.
Chatham	Brick; 2 stories	8	10,500	40	262†	Outside privies carefully attended to.	2 shafts, warmed by contained hot air pipes.	By steam, direct and indirect.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Livingston	Side light	6	Yes	Yes	None given.
Tuckahoe	Light from all sides; in some rooms from front in others from rear, in all from both sides.	No. 1.....5 No. 2.....5	No. 1, no; No. 2, yes.	Yes	Only suggestion for improvement is to build a new school-house. Hours in No. 1, 9 to 11.30, and 1 to 3.30; in No. 2, 9 to 12, and 1 to 3.
Castleton, Rensselaer Co.	Windows admit light back and sides.	5½	Yes; one in fore-noon.	When necessary.	The sewer on south side of yard, which is now covered by boards not close, might be made a tightly covered one.
New Paltz	1 room light from left and back, other right and back.	6	Yes	Under certain circumstances.	None given.
Monsey	Placed at right angles to windows.	9 A. M. to 4 P. M., 6	Yes	Yes	The building stands on elevated ground.
North Clove	Side light; 3 on each side.	6	Yes	Generally	There is a piece of wall plastering off near where stove pipe passes to chimney where a ventilator on the blind plan might be put.
New Utrecht	Very good	9 to 12, 1 to 3, 5	Yes	Yes	School-houses new and plenty of ground room and well drained; the 4th is old, in good order and meets the wants of district.
Springwater	Light to back and one side.	6	No	Yes	No remarks except as to condition of the closets, which are distinct from the main building.
Brasher Falls	Seats opposite windows, and lengthwise to windows.	6	Yes	Yes	The only thing I do not understand is in having register for exit of hot air to be situated near the floor instead of up above.
Campbell Hall	Well arranged	6	Yes	Yes	I find the sanitary condition of this school very good.
Russell	Seated at tables; light front and back.	6	Yes	In special cases.	A new school-house with proper desks needed; the building was originally erected for State arsenal, and is no way adapted for present purpose. The seats are wooden benches or chairs, the desks long tables; small pupils cannot touch floor with feet. Disgrace to town.
Rhinebeck	Light from right or left side.	9 to 12, 1 to 3.30, 5½	Yes	Yes	None given.
Chatham	Left side illumination	5½	No	Yes	The building is a good specimen of modern school architecture of the date of 1883, has hall in mansard roof.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita	Closets and drainage.	Ventilation.	Heating.
Fultonham	Frame; in good condition.	1	15,360	40	384	No drainage; vaults 30 ft. from b'ld'g; constructed to suit both sexes.	Through roof, 1 flue 2 feet by 3.	With 2 stoves; 80 feet pipe.
Lambs Corners	Frame	1	7,500	30	250	No drainage; privies	In top of room	Stoves.
Flushing	2 brick; 1 wood	No. 1, 10 rooms; No. 2, 8 rooms; No. 3, 3 rooms;	11,200	40	280	Drainage as good as can be had; closets in high school in wing off the building.	Through openings into shafts which open above roof; heating apparatus within shafts.	Furnace in 2 schools; stoves in 1.
Mt. Kisco	Good	4	9,000	40	225	Good	By windows	Coal stoves.
Sidney Centre	Frame	1	7,175	50	143†	No drainage; the closets are too filthy for swine.	By windows and doors only.	By wood stove.
Salamanca	2 brick; 1 wooden	No. 1, 2 rooms; No. 2, 2 rooms; No. 3, 11 rooms;	9,300	52	178†	Sewer to Allegany river; closets wooden and earthen in basement.	Steam heater in basement.	1 by steam; 2 by wood.
Wellsville	3 frame	No. 1, 8 rooms; No. 2, 1 room; No. 3, 1 room;	24,000	38	631†	Closets and drainage in poor condition but are to be changed the coming year.	By transoms and ventilators leading to chimneys situated at base of wainscoting.	By furnace and registers natural gas for fuel.
Lancaster	Brick; 3 stories and basement.	4	10,080	42	240	2 tile drains, 1 from closets other basement; closets brick and in good condition.	Fresh air is admitted from outside, heated and let into room in cold weather.	By furnace in basement; by steam pipes and hot air.
Edmeston	Wood	2	8,393⅓	40	209†	Closets at back side of lot several yards from school building.	At top and bottom of room.	Wood stoves.
City Island	Frame; kept in good repair.	4	7,843	42½	184†	Girls' closet in good order; boys' fair; drained by ditch at the side.	By windows	A stove in each room.
Hartford	Wood; large and in good repair.	2	8,250	32½	253†	No sewers; on slope; common separate closet.	By windows only	By coal stoves.
Rosendale	Good building; frame.	4	9,900	54	183†	Good natural drainage; closets in good condition; separate for sexes.	Through windows.	Coal stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued.*)

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Fultonham	4 tiers double seats 9 in a row; 4 windows on each side; 2 on end.	6	Yes	Yes	More perfect ventilation suggested; this is largest and best school in town; there are 16 schools, one-half in poor condition and all poorly ventilated.
Lambs Corners	Windows on sides	6	Yes	Yes	The ventilation is deficient in all the school-rooms; the windows are too high for proper ventilation.
Flushing	Light at back and left	Low grades 4; Int. grades 4½; high grades 5.	Yes	Occasionally	No suggestions for improvement under circumstances; the high and primary schools have water-works attachments; the teachers and scholars in the 3 schools are all well and no sickness from local causes.
Mt. Kisco	Seats against dead wall as far as possible.	5½	Yes; two	Yes	Scientific ventilation and heating by furnaces suggested.
Sidney Centre	Room lighted by 6 windows, light falling on backs of pupils except from end lights.	6	Yes	Yes	New and more roomy buildings suggested, which, however, will be hard to procure on account of the penurious disposition of the citizens.
Salamanca	Some rooms windows only in rear of pupil, in most rooms in rear and 1 side.	9 to 12, 1.30 to 4. 5½	No	Yes	All are to be heated in a short time by "natural gas"; recesses not given, as physical exercise under teacher's supervision is required.
Wellsville	All rooms are lighted from the side or side and back.	9 to 11.40, 1.15 to 3.40. 5	No	When it is a necessity.	Have calisthenics every half hour in lower grades; adding to main building; increase in size and number of ventilators; rearrangement of closets and improvement in drainage suggested; 1 main building and 2 small ones, all frame.
Lancaster	2 have light from back and right; 2 have light from back and left.	5½ to 5¾	No	Yes	Upper story is used for school hall; flues for bad air are at chimney near floor; the school is on elevated ground; the drains have outlet 100 feet from building and then empty into rivulet into which water is running good part of year; building is in open space; no tree or dampness.
Edmeston	Seats face eastward with windows on north, south and west sides.	9 to 12, 1 to 4; 6	Yes	Yes	None given.
City Island	Light from either side and behind the children.	9 A. M. to 3.30 P. M. 5½	To small pupils.	Yes	Painting school-house and cleaning same, suggested, which will be done during the year.
Hartford	Seats front end of room; windows each side.	6	Yes	Yes; 1 at a time.	Evident lack of ventilation and too many pupils in rooms; as each pupil should have 400 cubic feet, with excellent ventilation; many pupils have headaches, are listless and often ill; not enough care taken to keep the rooms clean; same trouble with closets.
Rosendale	Windows on opposite sides of rooms; seats in 4 sections with end of seats to windows.	6	Yes	Yes.	

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation	Heating.
Milton, Westchester Co...	Frame; in good condition.	1	8,525	26	327†	Drainage good; closets; a large cemented vault.	From top of building; there is no attic.	Large stove in class-room.
Rye.....................	Large frame; in good condition.	4	14,250	45	316†	Drainage is good; closets are cemented vaults.	At sides at bottom of rooms and at the top of building.	By heaters in cellar.
Wyoming	1 brick, 2 story; 1 frame, 1 story.	3 1	13,753⅓	40	343†	Drainage good; closets, out-houses in good sanitary condition.	No ventilation except by windows.	Wood stoves.
Margaretville	Wood, 2 story.....	1	11,520	65	177†	No drainage but surface drainage.	By windows.........	Wood stoves.
Redwood.....	Stone, in fair condition.	3	12,833⅓	35	366†	Natural and good drainage; common wooden closets.	By windows and doors.	By wood fires.
Poestenkill.............	Dilapidated........	2	5,688	20	284†	No drainage; closets in very bad condition.	By windows and doors.	By coal stoves.
Masonville	2 stories; in fair condition.	2	9,600	39	246†	1 closet partitioned for boys and girls; vault underneath.	By windows.........	By a wood stove in each room.
Palmyra.................	Brick	10	8,835 1-5	45	186†	Earth closets...........	By windows and doors; no means of ventilating except direct draught.	By common coal stoves.
Bleecker	6, 1 story frame buildings.	1 room in each school.	5,175	25	207	No drainage; closets without vaults.	By windows and doors.	By wood stoves.
Knowersville	Wood...........	2	13,923	50	278†	Surface drainage; closets 80 ft. in rear of building.	By windows.	Stoves.
Little Falls..............	2, stone; old but good; 1, new, excellent.	No. 1, 8 rooms; No. 2, 6 rooms; No 3, 4 rooms.	8,666⅔	50	173†	1, no drainage, but water in closet; 2 and 3 no drainage; earth closets.	1 and 2 windows; 3 Ruttan system.	1st, stoves; 2d, stoves and furnaces, 3d Ruttan system.
Angola.	Brick; 2 story.. .	3	14,421⅓	53⅓	270†	Drainage good; closets of wood with vault.	By windows and chimney flues.	By coal stoves.
De Ruyter	Stone; built 50 years ago.	4	11,087⅓	35	316†	No drainage; closets; vaults bad.	By windows.	Coal stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Franklin Falls	Light from sides and front.	9 to 12, 1 to 4, 6	Yes	Yes	Our schools are small; the sanitary conditions are good, being on ground that is well drained.
Jonesville	On each side 3 windows and 2 in rear.	6	Yes; 2 forenoon and afternoon.	Yes	Building has healthful surroundings; I think room should be larger and higher, and ventilators with flues put in room.
Schenectady	So arranged to have light fall over left shoulder of pupil.	4½	No, except to younger pupils.	Yes	More light seems to be needed in some of the rooms.
Brookfield	Students receive cross light from windows.	8.45 to 12, 1 to 4, 6¼	Yes	Only at recess, except in case of absolute necessity.	Enlargement of building and addition of recitation room suggested; the building is painted, well warmed and lighted; during recess of 5 minutes each session there is complete ventilation.
Marcellus	Light from sides and back of room.	8.30 to 12, 1 to 2, 5½	Yes; one in forenoon.	Sometimes	New building, heating, ventilating and closets suggested.
Warwick	With backs to light as far as possible.	5½	No	Theoretically, yes practically, some of them only.	Restore the recesses, what say you? there is need for the recesses, especially among the juveniles; now only one pupil can leave the room at a time and may remain absent for five minutes; but if every pupil wished to go out a large number would never find an opportunity for want of time; I am for recesses.
Laurens	Upper room has windows on all four sides; the lower, on all but one.	9 to 11.45, 1 to 3.45 5½	No, except very small pupils.	Yes; have privilege of going out one at a time.	Should have better ventilation and heating arrangements; the building needs some repairs inside; coal stoves would be better than wood.
Black Creek	In 1 room windows on both sides of seats; in other room on 1 side & back.	6	Yes	Yes	No suggestions for improvement except in ventilation of school-rooms; which would apply to the whole town and the most of country schools.
Champlain	Windows on 3 sides	9 to 12, 1.30 to 4.15 5¾	Yes; 10.30-10.45, 3 to 3.15; these recesses are compulsory.	Usually, when request is made; not always; the habit is discouraged; such requests from larger pupils rare; little ones allowed more liberty.	The chimneys act as ventilating flues heated by fires in open fire-places; the ventilation scheme given is that now ordered by the school board, and about to be put in operation; when this is accomplished I think the building will be in very satisfactory condition.
Rye Neck	In large room No. 1 light from each side, in other rooms from rear of scholars.	9 to 12, 1 to 3, 5	Yes	Yes, when it may be necessary.	A radical change in ventilation suggested, noon hour 12 to 1, and recess in forenoon from 10.35 to 10.45; in afternoon, 2 to 2.05.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
New Baltimore..........	2 story building ...	2	6,671⅜	54	123†	No drainage at all; closets 19 feet from hall door and entirely exposed.	In lower room by small tin ventilators placed in lieu of a pane of glass in the 4 windows on sides of house; upper room has but 1 of these ventilators in 1 of the windows; each ventilator has 4 spaces 2⅛ long 2⅛ broad at wide end and 1⅛ at small end.	By a coal stove; no metal screen around stove and no stove ventilation.
Macedon	Old................	3	9,600	46⅔	205†	Grounds well drained; closets in bad condition.	By windows.........	Stoves.
Meridian................	Brick, old.........	2	7,407	34	217†	No drainage; closets in poor state of repair.	By windows.........	By coal stoves.
Niskayuna....	4 new buildings of wood.	1 in each school.	7,098	21¾	326†	No special drainage provided; closets at distance from school building.	By windows; ventilation imperfect in all cases.	Coal stoves.
Monticello	2 schools, 1 not in use; brick.	4 { 2 2	13,200 5,000	90 20	146† 250	Closets are out-houses, with cesspools not drained.	By windows only . .	Partly by furnace and by stoves in each room.
Napanock............ ...	A substantial frame building.	3	8,846	38⅓	230†	No drainage except natural slope of ground; water-closets mentioned in remarks.	By shaft from foundation to top of building.	By coal stoves in each room.
Bangor, District 2........	Not first class.....	2	9,251	30	308†	No drainage; privy about 1 rod from building; very filthy; deposits on top of ground in and about the privy.	By windows only....	By furnace.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangements of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Milton, Westchester Co.	Good	9 A. M. to 3 P. M., 5	Yes	Yes, whenever it is necessary.	Recess from 10.30 A. M. to 10.45 A. M., and from 12 M. to 1 P. M.
Rye	Are so arranged that light falls on the right and left sides of children.	9 A. M. to 3 P. M., 5	Yes	Yes, whenever it may be necessary.	Recess from 10.30 to 10.45 A. M., and from 12 M. to 1 P. M. There is 1 recitation-room in building.
Wyoming	Light from the rear, except in 1 room that cross-light.	6	No	Yes	Everything is in quite good condition except the ventilation, which is *bad*.
Margaretville	Each room lighted by 3 windows on each side.	6	Yes	Yes	Could not be much improved; stands in a dry locality on a slight eminence; I think the condition good.
Redwood	Light principally from sides.	9 A. M. to 4 P. M., 6	Yes	Yes	There should be new seats in 2d and 3d depart's; the sanitary condition of our village and whole township is good.
Poestenkill	Light enters from each side and rear of seats	6	Yes	Yes	It is suggested that there be a new school-house built; there is, in the vicinity of school-house, several closets without drainage, and at times they emit a terribly offensive odor.
Masonville	Light from sides and rear.	Forenoon 3, afternoon 3. 6	Yes	Arrangement of out-bild'g makes it necessary.	15 minutes recess is given older pupils, more to younger; there is need of 2 out-buildings and urinal for the use of the boys.
Palmyra	Windows to left of seats on north side, at right on south side.	6	A part of the time.	Yes	Tear down present structure and build a new; the building is surrounded by trees greatly hindering the entrance of light; are not windows enough or situated rightly to admit sufficient light; the ventilation during weather when windows cannot be open is simply terrible; the atmosphere is not fit for a dumb animal to inhale or breathe; the only thing to do is to remodel or build anew.
Bleecker	Windows on two oblong sides of building; cross-light.	9 A. M. to 4 P. M. 6	Yes	Yes	With proper care on part of teacher, all can be duly heated and ventilated; they fairly meet wants of districts in which they are located.
Knowersville	Cross-light from side windows.	6	Yes	Yes	Jackets for stoves, with cold air pipe.
Little Falls	[See remarks.]	9 to 11.40, 1.30 to 3.40. 4 hrs., 50 min.	Not general recesses.	Yes, freely	In 2 and 3 closets are removed from school; recesses are given in younger grades; 1st, 4 rooms, full light; 2d and 3d, none, (sic).
Angola	Lighted from sides	5¼	Yes	Yes	There are 2 recitation rooms in building; it is suggested that an addition be made to the building, and an additional department created.
De Ruyter	Light comes from 1 side and back.	6	Yes	Yes	None given.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
New Baltimore..........	2 story building ...	2	6,671⅜	54	123†	No drainage at all; closets 19 feet from hall door and entirely exposed.	In lower room by small tin ventilators placed in lieu of a pane of glass in the 4 windows on sides of house; upper room has but 1 of these ventilators in 1 of the windows; each ventilator has 4 spaces 2⅛ long 2⅛ broad at wide end and 1⅛ at small end.	By a coal stove; no metal screen around stove and no stove ventilation.
Macedon	Old..............	3	9,600	46⅜	205†	Grounds well drained; closets in bad condition.	By windows.........	Stoves.
Meridian................	Brick, old.........	2	7,407	34	217†	No drainage; closets in poor state of repair.	By windows.........	By coal stoves.
Niskayuna....	4 new buildings of wood.	1 in each school.	7,098	21¾	326†	No special drainage provided; closets at distance from school building.	By windows; ventilation imperfect in all cases.	Coal stoves.
Monticello	2 schools, 1 not in use; brick.	4 {2 {2	13,200 5,000	90 20	146† 250	Closets are out-houses, with cesspools not drained.	By windows only . .	Partly by furnace and by stoves in each room.
Napanock............ ...	A substantial frame building.	3	8,846	38⅛	230†	No drainage except natural slope of ground; water-closets mentioned in remarks.	By shaft from foundation to top of building.	By coal stoves in each room.
Bangor, District 2........	Not first class.....	2	9,251	30	308†	No drainage; privy about 1 rod from building; very filthy; deposits on top of ground in and about the privy.	By windows only....	By furnace.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
New Baltimore	Seats face the north; windows on east, west and south.	8 in morning and afternoon. 6	Yes	Yes	Another room should be added to house or better a new house built; as closets are but 19 feet from hall door it is unnecessary to suggest to you they should be removed; closet doors off from hinges; seats unprotected; board torn from floor and cleanliness unknown; as for ventilation, practically there is none; can you wonder that mothers tell me their children have so much headache when they attend school.
Macedon	Good	5½	No	Yes	We need everything all through; building in bad shape; need new building.
Meridian	Back and side lights; very fair.	6	Yes	Yes	None, except the abolishment of old building and erecting a new one, conforming to modern plan of comfort and sanitary science; present structure in bad and dangerous state of decay; the stoves raise the temperature in back part of rooms in coldest weather but slightly above freezing.
Niskayuna	Good, with one exception.	6	Yes	Yes	That awnings be provided in District No. 1, to be used during the summer months; better drainage also needed in same school-yard; No. 2, improvement in heating needed; in all cases better ventilation, greater cleanliness of closets and better water supply; only one school is provided with a well on or near school property, and that receives surface water.
Monticello	Side lights in all cases but one.	6	Yes	Yes	I would suggest some system for ventilation; that the out-houses be further removed from school building with some plan for frequent removal of the excreta, and more space per pupil; the present plan of ventilating by windows is most pernicious.
Napanock	For higher department, windows on each side of pupil; intermediate department, windows at back and each side of pupil; primary department, windows behind and at left of pupil.	6	Yes; morning and afternoon each 20 min., including dismissal and calling to order.	At recess and at other times when thought necessary.	Water-closets are poor; accumulations allowed to remain; here is great room for reformation; ventilation is also had by means of the windows; they are opened in summer; in winter, opened mornings and after school and during recess; a means of ventilation also secured by allowing lower sash to extend above lower part of the upper, thus leaving a space for an upward current of air.
Bangor, District 2	(a)	6	Yes; of 15 mins. duration.	Yes	There should be a change in manner of ventilation, as also in the condition of privies.

(a) Windows on each side of building; no end windows; seats in line with windows; all the seats facing toward one end.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Worcester, Dist. No 4 ...	Wood; old & poor.	1	4,356	12	363	No drainage; closets in end of school house filthy and unclean.	By door and windows	By stoves.
Worcester, District No. 8.	Wood, new........	1	9,408	20	470†	No drainage, and 2 good closets well kept.	By windows..	By stoves.
Worcester, District No. 9.	Wood.............	1	4,000	24	166†	No drainage to closets; 3-foot vault.	By windows only ...	By wood stove.
Worcester, District No. 7.	Wood; in good repair.	1	6,000	18	333†	Side hill drainage to closet.	By windows and 1 door.	By wood stove
East Worcester, Dist. No. 3	Wood.............	2	Cubic dim. not given.	35	....	Closets clean; no drains.	Only by doors and windows.	By stoves, 1 in each room, and horizontal pipe to chimney.
Worcester, District No. 2.	Wood.............	1	3,200	12	266†	Closets clean; no drainage.	By windows and door.	By wood stove.
Worcester, District No. 15.	Old...............	1	4,356	22	198	Closet clean and quite good.	By windows and door.	By wood stove.
Worcester, District No. 18.	Wooden...........	1	4,356	22	198	Closets clean; no drainage; stand on side gulf and gravel soil.	By windows and door.	By wood stove.
Worcester, District No. 19.	Old; wood...	1	4,140	10	414	Closet filthy.....	By windows and door, also through the floor.	By wood stove and old rusty unmatched stove pipe, which must necessarily smoke the room.
Worcester, District No. 14.	New; frame.....	1	4,840	18	268†	Closets clean, no drainage, soil gravelly.	By windows.........	By wood stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
North Bangor, District 1.	Seats facing north end windows on east and west side· no end windows.	6	Yes	Yes	In regard to this school, and all other schools in the country districts, I would and shall suggest to the trustees that a large supply of dry earth be provided, and the excrement be thoroughly covered each day with the same; also, that at the end of each term of school the excrement shall be thoroughly cleaned out and removed
Bangor, Dist. No. 3	Seats facing end of building; windows on each side.	6	Yes; recesses of 15 mins both forenoon and afternoon.	Yes	Trustees have promised to improve condition of privies; school hours are 3 in morning, 1 hour nooning, and 3 hours in afternoon.
Bangor, Dist. No. 4	Seats facing end of building, windows on each side in line with seats.	6	Yes	Yes	None given.
Bangor, Dist. No. 5	Seats facing end of building, lights on each side	6	Yes	Yes	None given.
Bangor, Dist. No. 6	Side lights; seats facing end of building.	6	Yes	Yes	Condition of privies must be changed.
Bangor, Dist. No. 7	Side light; also lights in one end.	6	Yes	Yes	Shall insist on change in condition of closets
Bangor, Dist. No. 8	Side lights; seats facing end.	6	Yes	Yes	Condition of closets must be improved.
Bangor, Dist. No. 9	Seats facing end of building, windows on each side.	6	Yes	Yes	None given.
Bangor, Dist. No. 13	Side lights; seats facing end of building	6	Yes	Yes	None given.
Granville	Seats not arranged with regard to light, but so as to get most pupils in small space; light in different rooms from all points of compass.	9 to 11.45, 1 to 3.45. 5½	Not allowed in three upper departments.	Yes	Provide breathing room and ventilation is a suggestion for improvement; there are 105 pupils in the primary room, which has a capacity of 8,624 cubic feet, and 50 in a room of 4,368 cubic feet, each room has its stove.
Oswego Falls	Arranged to face the dark side, and light falls on books from sides and rear	6	Yes	Yes	The cellar in District No. 15 should be drained and provision should be made for properly ventilating the rooms.
Worcester, Dist. No. 6	Seats so arranged as to receive light at sides and back.	6	Yes	Yes, by permission.	Building not well heated nor ventilated, and rooms overcrowded; building has one recitation room

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms	Average cubic dim of each class-room	Average number of pupils in each	Average air space per capita.	Closets and drainage	Ventilation	Heating.
Chemung	Old, wooden.. .	2	9,375	33	284†	No drainage, closets, out-houses	By windows . .	Large coal stove in front of scholars.
Almond	New building, in good repair.	2	16,800	27	622†	No drainage, closets are disconnected from bldg.	By 2 ventilators in ceiling	By 2 stoves
Le Roy, District No 1. ..	Brick..	2 {1 2	12,096 3,488.87½	70 42½	172† 82†	Sewer to creek; closets brick; vaults in splendid condition	Ventilators in upper part of walls, and windows and doors	Coal stoves
Le Roy Academy..	Stone basement, 2 stories, wood.	2 {1 2	50,400 10,080	90 45	560 224	Drainage by sewers; closets, wood, with boxes removed every week or so	By means of ventilating flues	By coal furnaces and stoves
Ingham Univer'ty, Le Roy.	Wood and poor ...	6 {1 2 3 4 5 6	3,000 4,800 2,376 2,376 2,376 13,046	15 25 15 15 15 55	200 192 158† 158† 158† 237†	Sewer to creek, closets, wood with boxes cleaned every week	Cold air flue and windows and doors.	By furnace.
Le Roy, District No. 3 ...	Wood, in very good repair.	2	6,156	31½	195†	No drainage, closets, wood, in good condition	By windows and doors	Coal stoves
Le Roy, District No. 4. .	Brick, in good condition	2 {1 2	10,368 6,612	45 45	230† 146†	No drainage, closets, wood; vaults in good order	Ventilators in ceiling	Coal stoves
Le Roy, District No. 5 ..	Wood, in fair repair.	1	2,880	19	151†	No drainage; closets with vaults in good condition	By windows and doors	By wood stoves.
Le Roy, District No. 6....	Wood, in very poor repair.	1	3,840	12	320	No drainage; closets wood, very poor; no vaults or boxes	By windows and doors	By wood stove.
Le Roy, District No. 7.. .	Stone..	1	3,840	32½	118†	No drainage, closets wood, opening from wood-house, with shallow vault.	Very little, as the windows cannot be lowered from the top	By coal stove

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours	Remarks, etc.
Worcester, Dist. No. 4	Seats so arranged that light falls upon them from side windows only.	6	Yes	Yes, by permission.	Building not fit to be used for school purposes; no land for site, new building suggested; enlarged site; closets placed at suitable distance from school-house; the present building and arrangement of closets all wrong and ought to be condemned at once by board of health.
Worcester, District No. 8	Seated so as to receive light from side windows only.	6	Yes	Yes, by permission.	Building has large site; it is suggested to have windows in rear of building so as to give light from back of seats; in all other respects this is a good building and well fitted for the purpose for which it was designed.
Worcester, District No. 9.	2 windows on each side and 2 on rear end, and seats in good condition; board seats.	6	Yes	Yes, upon request.	This is an old house, but in fair repair; this district should be attached to District No. 8 Union Free School, which would be a benefit to both districts.
Worcester, District No. 7	Seated with 2 windows on each side and 2 rear windows.	6	Yes	Yes, on request.	None given.
East Worcester, Dist. No. 3	Each room lighted by side windows; 6 windows per room, seats arranged only to receive side light.	6	Yes	Yes, upon request.	I would suggest a new and more commodious building with basement and warmed with heater, as stoves fail to equalize the warmth through the rooms; the seats and desks are very poor and unfit for children to sit on or to use.
Worcester, District No. 2	2 windows on each side of seats and 2 in rear.	6	Yes	Yes, upon request.	The building is old, clean and in fair repair; it should be replaced with a new one, or the district united with No. 8 Union Free School adjacent thereto.
Worcester, District No. 15.	Seats arranged with 2 small windows, as side lights, each side.	6	Yes	Yes, upon request.	The building is now undergoing repairs.
Worcester, District No. 13.	2 windows in rear of seats, 2 on north side and 1 on south side.	6	Yes	Yes, on request.	The building is clean and in fair condition; seats and desks, boards, and fair school-house; quite a good frame building; fair average arrangements for running a country district school.
Worcester, District No. 19.	Seats arranged with 2 windows each side and 2 in rear.	6	Yes	Yes, on request.	This house should be replaced with a new one; the present building is old, has worn-out floor, worthless wood desks and seats; half the underpinning out, very cold in winter, hardly suitable for a swine pen in cold weather; should have been condemned long ago; the inhabitants are abundantly able to have a decent and comfortable building.
Worcester, District No. 14.	Seats arranged with 2 windows at each side and 2 in rear.	6	Yes	Yes, upon request.	The building is 22x28.10 feet in height of rooms; it has wood seats and desks, and is best district school-house for country district so far visited.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Le Roy, District No 8	Stone..	1	4,158	15	277†	No drainage, closets are wood with vaults.	By windows and doors.	By coal stove
Le Roy, District No 10 ..	Brick...........	2 {1 2	8,640 6,480	30 40	288 162	No drainage; closets wood in good condition	Ventilators in ceiling.	Coal stoves
Le Roy, District No 11 .	Wood.	1	4,600	Not given.	. . . .	No drainage; closets wood, no vaults; in filthy condition.	By windows and doors	By wood stove.
Le Roy. District No. 12 .	Wood and very poor.	1	3,960	36	110	Closets new with good vaults, situated on sandy soil, sloping north.	By windows and doors only.	Stoves.
Le Roy, District No. 14 .	Wood; in good repair.	1	7,488	35	213†	Drainage, none; closets; vaults in fair condition.	By doors and windows, 2 ventilators in ceiling	Coal stove.
Le Roy, District No 15...	Wood; in fair repair	1	5,280	40	132	No drainage, closets wood, dilapidated and	By windows and door.	Wood stove.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Chemung	2 windows behind; 2 each side, some shaded.	5	Yes	Occasionally	Building has both rooms on first floor; might try surrounding the stoves with sheet iron admitting air under the stove, and making flue above the back of the room; the seats are not of an approved pattern.
Almond	Back and side lights	6	Yes: 2 a day	Yes	That there be a change in ventilation and drainage.
Le Roy, District No. 1	1st, seats face north, light from east and west; 2d, seats face south, light from east and west.	3 in A. M. and 3 in P. M. 6	Yes	Yes	The building is in first class repair; no suggestions for improvement given except enlarging building, as you will see in one room that each student only has about 172.8 cubic feet of air, while in the other they only have from 77 to 87 cubic feet.
Le Roy Academy	1st, seats face north with light from east, west and south; 2d, seats face south with light from north and east.	3 in A. M. and 2 in P. M. 5	In A. M., yes	Yes	Building all in good repair; the erection of better closet for the male students.
Ingham Univer'ty, Le Roy.	(a)	3 in A. M. and 2 in P. M. 5	No	Yes	No suggestions for improving present building; need a new building very much, and strong efforts are being made to have one and think will be successful.
Le Roy, District No. 3	No. 1, seats face north, light from south and west; No. 2, seats face south, light from north and east.	3 in A. M. and 3 in P. M. 6	Yes	Yes	None given.
Le Roy, District No. 4	No. 1, seats face east, light from north and south; No. 2, seats face west, light from north and south.	3 in A. M. and 3 in P. M. 6	Yes	Yes	None given.
Le Roy, District No. 5	Seats facing south; light from all sides.	3 in A. M. and 3 in P. M. 6	Yes	Yes	Closing windows on south side entirely and raising of the ceiling.
Le Roy, District No 6	Seats face east; light from north, west and south.	3 in A. M. and 3 in P. M. 6	Yes	Yes	School building should be thoroughly repaired.
Le Roy, District No. 7	Seats face south; light from north and east principally.	3 in A. M. and 3 in P. M. 6	Yes	Yes	Building is in poor repair on inside; inside work should be torn out and replaced with modern school seats, and ventilators put in or windows fixed so they can be lowered.

(a) One room seats face north, light from east; 1 room seats face east, light from west; 3 rooms seats face west, light from east; 1 room seats face north, light from west.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Fabius	Wooden	3, 2 used { 1 2	11,760 13,500	39 40	301† 337†	No drainage; closets have deep holes under them.	From the windows	Coal stove.
Avoca, P. O	Frame	8	19,200	40	480	Closet pits dug down to gravel and stoned up.	By windows.	Stoves.
Dansville	Substantial, but old.	7	15,714 2-7	57 1-7	275	Closets outside at distance of 10 rods.	By way of windows and cracks under the doors.	Stove in each room.
Warsaw	3 story, brick	7 { 1 6 each.	18,000 7,200	54 54	333† 133†	Sewer pipes emptying into creek; water-closets.	By registers in chimneys near ceiling.	By furnaces.
Wellsburg	Wooden.	3 { 1 2 3	6,600 6,600 15,000	44 16 40	150 412† 375	No drainage; very poor closets.	By the windows and a stair way	By stoves.
Cairo	Frame	2 { 1 2	8,000 1,200	40 30	200 40	Surface drainage; closets attached to main building.	None other than door and drop windows.	2 coal stoves, 1 in each end.
Richfield	7 wooden buildings, all in good repair.	1 class-room in each school	4,752	27	176	Little attention is paid to drainage, except that a sloping site is usually chosen.	Only by windows and doors opening onto the school room	Stoves.
Big Flats	Ordinary wooden.	2 { 1 2	8,748 8,748	40 28	218† 312†	No drainage, poor closets.	Only by doors and windows.	By stoves.
Smithville Flats	Wood, and in good repair.	3 { 2 1	5,700 16,040†	30 40	190 401†	Good	Well	Wood stoves.
Cochecton	Fair	1	8,112	35	231†	Natural drainage, closets in bad order generally	By windows.	By stoves

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Le Roy, District No. 8....	Seats face east; light from north, south and west.	3 in A. M. and 3 in P. M. 6	Yes............	Yes............	Building is in good condition; a more modern system of ventilation suggested.
Le Roy, District No. 10...	Seats face east; light from north and south.	3 in A. M. and 3 in P. M., 6 hrs.	Yes............	Yes............	Building is in first-class condition.
Le Roy, District No. 11...	Seats face north; light from north, east and west.	3 in A. M. and 3 in P. M. 6	Yes............	Yes............	Building is in fair repair; it is suggested to turn the seats so light would come from the back and sides instead of from face and sides; also erect decent closets with vaults.
Le Roy, District No. 12...	Seats facing east; light from north, south and west.	A. M. 9 to 12, P. M. 1 to 4. 6	Yes............	Yes............	This district needs a new building sadly, and one sufficiently large to accommodate the number of scholars to better advantage.
Le Roy, District No. 14...	Seats face east; light at sides and rear of seats.	9 to 12 A. M. 1 to 4 P. M. 6	Yes............	Yes............	The school building is better than the average in country districts.
Le Roy, District No. 15...	Seats face east; light from north, west and south.	3 in A. M. and 3 in P. M. 6	Yes............	Yes............	Erection of new closets entirely.
Coventry..................	Lighted at sides and back.	9 to 12, 1 to 4.... 6	Yes............	Yes............	Recesses are from 10.45 to 11 A. M. and 2 45 to 3 P. M.; suggestions for improvement of present condition are changing light from rear to side, enlarging and ventilating room and improving condition of closets.
Millerton	Lights at back, right and left.	6	Yes............	No............	That the privy be cleaned and the girls' closet removed farther from the building, there is 1½ acres in school grounds and there is plenty of room for removal.
Wallkill..................	Light principally from the sides.	9 to 11.45, 1 to 3.45. 5½	Yes............	Yes............	The building is in good repair; the recesses are given in the primary and intermediate; the present condition in given respects, is good.
Pottersville..............	Cross lights; side windows.	9 to 12, 1 to 4.... 6	Yes............	Yes............	To build another room above and divide the school, put in patent desks and ventilate; have tried to do this but the taxpayers or rather the old fogies fight us.
Belleville................	In large room light both sides and backs; small room back and front.	9 to 11.45, 1 to 3.45. 5½	No; calisthenics or gymnastics every hour or hour and a-half.	To some extent but not very much.	Building is large upright with wing-cellar under upright; the building is on a lime stone knoll; the seats in small room should be rearranged so as to light them from the sides; the blinds should be cut in two so as to let the light in from top of windows in both rooms; there should be better means of ventilation; have made some suggestions to trustees in regard to cellar; there is a well in celler the water of which is said to be not good and is not used, which ought to be done away with.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation	Heating.
Delmar	Brick	2	5,476	20⅓	267†	(Under remarks.)	Center of ceiling by trap opening in garret.	By coal stoves.
Woodhull	Wood, 3 stories	3 { 1	21,296	37	575†	Stands on high ground; water-closets in good condition 75 and 100 feet away.	Academic room by windows and doors at sides and 2 by 2 feet in center top to open belfrey; other rooms only by doors and windows.	By box stoves and wood fires.
		2	7,344	37	198†			
		3	5,184	37	140†			
Brighton (Village)	Brick, in good condition.	4—3 used. { 1	11,520	23	500†	Cellar dry; closets; vaults near the house.	By a small register in chimney near the ceiling.	Stove.
		2	8,640	29	297†			
		3	8,640	51	169†			
Mechanicville	2 { 1st frame	2 { 1	5,751	38	151†	Closets away from building; vaults.	No. 1, iron ventilators in ceiling. No. 2, none.	Coal stove.
		2	5,751	74	77†			
	2d brick	2 { 1	20,250	30	675			
		2	10,125	45	225			
Town of Sheldon, District No. 2.	Frame	1	3,738	14†	267	No drainage at all	No ventilation except by opening the windows.	Wood stove.
Town of Sheldon, District No. 3.	Frame	1	5,266	28†	188†	Moderate surface drainage to east; closets, frame, not ditched.	No ventilation except by opening the windows.	Wood stove.
Town of Sheldon, District No. 4.	Frame	1	3,708	10†	370†	Surface drainage to south and west; closets frame not ditched.	No ventilation except by opening the windows.	Wood stove in center of room.
Town of Sheldon, District No. 5.	Frame	1	4,225	15	281†	Slight surface drainage to west; closets frame, not ditched.	No ventilation except by opening the windows.	Wood stove.
Town of Sheldon, District No. 6.	Frame	1	2,666	11†	[illegible]	Surface drainage to south-west; closet frame, not ditched.	No ventilation except by opening the windows.	Wood stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*)

PLACE.	Arrangement of seats.	School hours	Recesses	Are children allowed to go to closet in school hours	Remarks, etc.
Fabius	Light from behind and from right side.	6	Yes	When necessary.	The seats are poor and uncomfortable, and the vaults under closets are deep and have not been cleaned in years and are liable to infect our wells.
Avoca, P O	Windows right and left of seats.	6	Yes	Yes	Heating with furnace suggested for improvement.
Dansville	According to hygienic laws.	9 to 12, 1.30 to 4, 5½	Yes	Yes	(*a*)
Warsaw	Light enters at side or rear chiefly side	4¾	None	Yes	No suggestions for improving present condition, with exception of taking off one story, flights of stairs rather long and steep.
Wellsburg	No arrangement; as they happen.	9 to 12, 1 to 4, 6	Yes	Yes	The building is in a fair condition of repair; recesses are 15 minutes, both in A. M. and P. M.; better ventilation and a general cleaning out of the premises suggested.
Cairo	The most light comes from the side.	5 hrs., 20 min	None.	None.	Building is in fair repair; I think there could be better ventilation by making an escape through the ceiling for foul air; the water-closets ought to be removed, at least detached from school building, or else thoroughly cleaned and disinfected every week or two; the building which has only one floor ought to be raised, and make two separate and distinct rooms, one for the advanced the other for primary class.
Richfield	Across the room light coming from behind and each side.	9 to 12, 1 to 4, 6	Yes	In the discretion of teacher.	(*b*)
Big Flats	Lights in rear and on sides.	9 to 12, 1 to 4, 6	Yes	Yes	Two recesses are allowed, one in A. M., and one in P. M., 15 minutes each.
Smithville Flats	Light reaches pupils from side and rear	6	Yes	Yes.	None given.
Cochecton	Windows on sides and back.	6	Yes	Generally	No suggestion for improving present condition, only the locality is bad as it is situated on low ground with a pool of stagnant water in front of building, which gets the drain from several privy vaults and stables.

(*a*) The building is situated on side hill; the recesses are allowed in lower classes, the immediate remodeling of the old building or the erection of a new building is imperatively demanded, and will probably be brought about within the year; the new building will be in more convenient location; the present one in use being on the outskirts of the district limits and making a distance of nearly 1½ miles to opposite district limits.

(*b*) The pressing need in our country school-houses is one of ventilation, they are particularly bad in that respect; doors and windows are tightly closed in cold weather without any means for admitting fresh air or driving out that which has been rendered impure; in this respect they could not be worse; the arrangement of closets is also very bad, in more than half the cases both sexes using the same closet, often tumble down affairs and seldom if ever cleaned; every school-house should be provided with a separate privy for the sexes, and they should be cleaned thoroughly at least twice each year.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Sheldon, District No. 7.	Frame; old........	1	3,766	8,971 (sic.) 9	418†	A moderate surface drainage to north-west; closet, frame, not ditched.	Not at all except by opening the windows	Wood stove.
Town of Sheldon, District No 8	Frame	1	5,813	17,047 (sic.) 17†	341†	Moderate surface drainage to east and north; closet, frame; not ditched.	No ventilation, except by opening the windows.	Wood stove.
Town of Sheldon, District No. 9	Frame	1	5,515	18,007 (sic.) 18†	306†	Surface drainage to east and south; closet, frame; not ditched.	No ventilation, except by opening the windows.	Wood stove.
Town of Sheldon, District No. 10.	Frame	1	8,555	29,502 (sic.) 30	285†	Surface drainage to west side; closets, frame; no box or dug out	No ventilation, except by opening the windows	By wood stove in center of room

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Delmar	Light from each side	1 has 5¼ hours. 2 has 5 hours.	{ 1 no. 2 yes	Yes	The school in which recesses are allowed has two of 15 minutes (younger children); there is a closet 25 feet north of building that has never been cleaned in a number of years; facing the closet are 4 windows and main door for 1 room.
Woodhull	All with windows at sides and back	6	Yes	Yes	The primary room is much too small and about one-third cannot be properly ventilated; the intermediate is better but lacking; the academic for space, light, and ventilation is beyond reproach.
Brighton (Village)	Lighted at left side	6	Yes	Yes	Do not think the ventilation is what it should be; would put in larger registers and place them near the floor, and build the chimneys higher to increase the draught.
Mechanicville	Rear and side lights in all rooms.	6	Yes	Yes	The buildings are in good repair; the village embraces parts of 2 districts, each district having 1 school; union of the 2 districts and the erection of a suitable building suggested.
Town of Sheldon, District No. 2.	Seats west to east; cross-lights.	6 hours including recess.	Yes	Yes	There is one recess in A. M. and one in P. M.; curtains to windows, and widow-boards to improve ventilation needed; closet too near to school-house; average number scholars in each class-room 14, 286 (sic.).
Town of Sheldon, District No. 3.	Seats west to east; cross-light.	6	Yes	Yes	(a)
Town of Sheldon, District No. 4.	Seats east to west; cross-light.	6 hours including recess.	Yes	Yes	There is one recess in A. M. and one in P. M.; the suggestions for improving present condition are stove-jacket, and removal of blackboard on north side; ventilators, curtains on south side and additional recesses; average number of scholars in each class-room 10,109 (sic.)
Town of Sheldon, District No 5.	Seats north to south; cross-light.	6	Yes	Yes	There is one recess in A. M. and one in P. M.; the suggestions for improving present condition are stove-jacket, on west side and east side and ventilators (window-boards); average number of scholars in each class-room 14,647 (sic.).
Town of Sheldon, District No. 6.	Seats from south to north; cross-light.	6 hours including recess.	Yes	Yes	There is one recess in A. M. and one in P. M.; the suggestions for improving present condition are curtains to the windows, stove-jacket and ventilation (window-boards); average number of scholars in each class-room 11,043 (sic.).

(*a*) There is one recess in A. M. and one in P. M.; it is suggested to abandon the two benches in north-east and south-east corners; stove-jacket and window boards to allow ventilation, would improve present condition; east wind will contaminate the air in class-room when the door is open, as the closets are on the east; curtains on south side also suggested; average number of scholars in each class-room 28, 407 (sic.).

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Sheldon, District No. 14.	Frame	1	6,333¼	1[illegible], 897 (sic.) 1[illegible]	395†	Surface drainage to east; closets, frame; not ditched.	No ventilation, except by opening the windows.	Wood stove.
Town of Sheldon, District No. 15.	Frame	1	5,659	8,072 (sic.)	.. ..	Very moderate surface drainage to south-east; closet, frame; not ditched.	No ventilation, except by opening the windows (see remarks).	Wood stove.
Town of Sheldon, District No. 16.	Frame	1	10,180	32,912 (sic.) 33	308†	Very little surface drainage south-west; closets, wood; not ditched.	By a hole in the ceiling, about 12x18 in.	Wood stove.
Town of Sheldon, District No. 17.	Frame	2	7,769½	44,317 (sic.) 44†	176†	A moderate surface drainage from west to east.	A ventilating grate to chimney in each room; insufficient.	At present by wood; in winter with coal.
Rochester.	30 schools; brick..	308 in all; vary in each school.	10,000	40	250	Drainage is good, excepting Nos. 22, 25 and 30; those few closets that are in the building are in good condition.	The R. F. A., Nos. 3, 4, 6, 10, 13 and 15 are well ventilated by brick flues, the others by means of the doors and windows.	Six are heated by steam, the others by furnaces and stoves.
Gloversville............	3 stories high; 3, brick.	12, 2 unused. } 1 6 } 2 6 } 3	7,586.8 10,944 10,368	53.6† 53.6† 53.6†	141† 204† 193†	(a)	(b)	No. 1 is heated by stoves, No. 2 by steam & No. 3 by a hot air furnace.

(a) The grounds are well drained, descent being in three directions from the buildings; the closets are out of doors, or rather in buildings of brick separate from the school buildings; they stand over the sewer, which runs longitudinally under them; this sewer is trapped after leaving the closets, between them and the main sewer, and it is cleansed by flushing from the hydrant; roof water also passes through it; seats are arranged in a row over the sewer; the boys' closets are also provided with a trough discharging into the sewer.

(b) Building No. 1 is ventilated by windows; by ventilators into chimneys; by doors and transoms into hall-ways, which are ventilated; the windows in all buildings are provided with "window boards;" No. 2 is ventilated as No. 1, except that there are no transoms; No. 3 has the "Ruttan" heating and ventilating system.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Sheldon, District No. 7	Seats from south to north; cross-light.	6	Yes	Yes	There is one recess in A. M., and one in P. M.; suggested that the map on west side be removed, stove-jacket, and ventilators (window boards); the closet is built against the school-house; there is no box. Now, as the slope is towards northwest, the excrementitious matter must infiltrate the ground under school-house, especially when washed towards it by heavy rains.
Town of Sheldon, District No 8.	Seats west to east; cross-light.	6	Yes	Yes	(a)
Town of Sheldon, District No. 9	Seats from south to north, cross-light	6 including recesses	Yes	Yes	There is one recess in A. M., and one in P. M.; the suggestions for improving present condition are, window boards to procure ventilation, curtains to all windows, abandon the desks at the sides (northwest corner and east side) and stove-jacket.
Town of Sheldon, District No. 10	Cross-light from south and north sides.	6 including recesses	Yes	Yes	(b)
Town of Sheldon, District No. 11.	Cross-lights from south and north sides.	6 including recesses	Yes	Yes	(c)
Town of Sheldon, District No. 12	Seats from south to north; cross-light.	6 including recesses	Yes	Yes	There is one recess in A. M., and one in P. M.; there is insufficient illumination of blackboards, the latter being in a corner of 6x9; the blackboard on west side is useless, that on east side not much better.
Town of Sheldon, District No. 13.	Seats west to east: light from south, west and north.	6 including recesses	Yes	No	There is one recess in A. M., and one in P. M.; the suggestions for improving present condition are, curtains on south and west side, ventilators (window boards), and stove-jacket; the children should be allowed to go to the closet during school hours

(*a*) There is one recess in A. M., and one in P. M.; the suggestions for improving present condition are to abandon blackboard on north side, stove-jacket and ventilators (window boards); at the time of prevailing east wind, contaminated air may gain easy access to class-room by way of school-house door, especially during pleasant season when the door is kept open for ventilating purposes.

(*b*) There are two recesses in A. M., and two in P. M.; the suggestions for improving present condition are, stove-jacket, abandon the three desks in north-west corner, dark colored curtains, ventilators: the well on north side had been in use until a year ago; it is 14 feet deep and contains 12 feet of water, constantly overflowing by a drainage near surface (to west side): if closet on north side was removed the well might be made useful; the closets are neither ditched nor provided with boxes, the excrements collecting on ground surface; the school, however, is situated in center of village.

(*c*) There are two recesses in A. M., and two in P. M., the suggestions for improving present condition are, stove-jacket, abandon the blackboards on north and south sides, establish ventilation (window boards); when door to class-room is open, some pupils have to face the window on north-east corner (entrance hall); should be provided with dark curtains; there are dark curtains to all the windows of class-room; however, I do not know whether the teacher makes judicious use of them.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Bloomville	Poor	1	4,400	35	125†	No drainage and no closets.	By windows	Wood stove.
Perry	Brick	7	16,546 2-7	37 6-7	437†	Good drainage; closets all outside of the building at some distance away, reached by plank walk.	By ventilators in the walls and the windows.	Hot air furn'ces
Broadalbin	Very good	3 { 1 2 3	14,400 7,200 7,200	50 35 32	288 205† 225	It has no drainage	By windows	By coal fire.
Chaumont	A very good wood'n building.	3 { 1 2 3	19,600 12,250 5,250	30 30 20	653† 408† 262†	Drainage, etc., excellent	By ventilators in the walls and by windows.	By wood furnace and coal stove.
Youngstown	Brick	2 { 1 2	5,940 5,280	35 44	169† 120	Drainage natural; house and closets standing on brow of bank of Niagara river, 40 feet above water surface.	No system, except by doors and windows.	By coal stoves.
Mineola	Frame	1	10,000	30	333†	Stands on high ground, 2 common closets 50 feet away.	By windows	By a base burning coal stove.
Philadelphia	Wood	3	14,176⅔	40	354†	Good drainage and closets.	By windows and ventilators in chimneys.	Wood furnaces
Prospect	Frame	2	11,253	45	250†	Drainage good; closets for each sex.	By doors and spaces between windows.	By wood stoves

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Sheldon, District No. 14.	Seats west to east; cross-light.	6	Yes	Yes	There is one recess in A. M. and one in P. M.; the suggestions for improving present condition are, abandon bench in north-east corner, stove-jacket, ventilators (window boards), curtains on south side.
Town of Sheldon, District No. 15.	Seats west to east; cross-light.	6 including recesses	Yes	Yes	There is one recess in A. M. and one in P. M.; the suggestions for improving present conditions are, curtains on south-side, stove-jacket, ventilating escape-pipe to roof and window boards; they have a ventilating hole in the ceiling (about 14x26 in.), however, there is no escape from the roof; closet too near to school (4 feet).
Town of Sheldon, District No. 16.	East to west; cross-light.	6	A. M. and P. M.; yes.	Yes	Abandon blackboards on north and south sides; also the 2 desks in north-west and south-west corners; window boards, to increase ventilation; stove-jacket; there is 1 recitation-room in school.
Town of Sheldon, District No. 17.	Seats west to east; cross-lights.	6 including recesses	Yes	In upper room all are; in lower room the smaller ones only.	There is one recess in A. M. and one in P. M.; the suggestions for improving present condition are, abandon blackboards on south and north sides in upper story; stove-jackets; the blackboard on east wall on upper floor is also badly situated, because of the 2 windows at sides of it; ventilation insufficient during winter, when windows will have to be closed, as they would give cold draught over the pupils, for the ventilating-grate in chimney is too low down.
Rochester	Nearly all the seats or desks are so arranged that the light comes into the room over the left shoulder of the pupil.	Primary department, 4 hours; grammar department, 4½ hours.	No; a pupil is allowed to leave room by permission from teacher.	Yes	The suggestion offered for improving present condition is, the introduction of heating by steam, whereby proper ventilation can be secured; this is now the great desideratum in schools and other buildings.
Gloversville	The arrangement of seats is mainly so that the light is from behind and one side.	9.15 to 11.30 & 12 1.15 to 3.30 and 4 2¼ and 2¾ A. M. 2¼ and 2¾ P. M. 4½ and 5½ hrs.	Recesses are allowed in all grades except the 3 highest.	Yes	(a)

(a) A new school building will soon be called for, perhaps next year, to meet rapidly increasing demands; our ventilation is not in all rooms as good as it should be, but much attention is given to it by superintendent and teachers; heating by stoves will probably be abandoned and steam introduced into building No. 1 in the not distant future; overcrowding is probably our most serious fault at present; the average daily attendance has this term unexpectedly increased 100; the question of employing more teachers was discussed at the last meeting of the board of education, and was allowed to rest, expecting the bad weather soon to come to thin out the school, and our two unused rooms are not well adapted to use as class rooms.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued.*)

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Pleasantville..	2 story wood 45 by 33 feet.	3 { 1, 2, 3	11,470 11,470 1,584	38 55 12	301† 208† 132†	Drainage fair; vaults under privies.	Poor ventilation; 1 ventilator in chimney flue.	Hot air furnace in cellar.
Richford.	2 wood, both in good repair.	2 in 1 house 1 in the other. 3 { 1, 2, 3	10,408 8,640 4,968	30 30 12	346† 288 414	No drainage; on dry ground; good closets; for main building with vaults; for branch school over a brook	None except by doors and windows.	With stoves.
Pavilion..	Frame	2 { 1, 2	18,000 3,400	50 20	360 170	No drainage; privies away from building.	Only by doors and windows.	By coal stoves.
Himrods............	Frame	1	Not given.	Not given.	....	Not given..............	By 3 windows on a side.	By coal stove.
Conquest..	Old fashioned; wood.	1	Not given.	50	....	No drainage; wooden and old closets.	Windows and *walls*.	Coal.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Bloomville	Not very clearly given, but there are windows on three sides.	9 to 12, 1 to 4, 6	Yes	Yes	(*a*)
Perry	All windows at sides of seats, in some rooms on one side; in others on both.	8.45 to 12, 1.15 to 4 6	Yes	Yes	The suggestion for improving present condition is: To keep floors cleaned so no dust will rise every time class passes; the building is well ventilated; some of the rooms that are called class-rooms are ventilated between every division, or recitation, so the air is changed every forty minutes, more or less; closets are all in good shape.
Broadalbin	Light comes in at the sides.	6	Yes	Yes	Ventilation and water closets could be improved; children often complain that they "take cold" from having the windows down; windows are let down on opposite side of school-room and a draught is formed; no disinfectants have been used in closets, and not enough attention has been paid to cleaning, etc.
Chaumont	No. 1 right, left and back light, No 2, left and back No 3, right and back.	5½	No	Yes	Everything is all right.
Youngstown	Windows at the back and to righ and left.	6	Yes	At the discretion of teachers.	(*b*)
Mineola	Not given	6	Yes	Yes	No suggestions for improving present condition; it is better than common.
Philadelphia	Lighted by windows at side and back of pupil.	6	In the A. M.; none in P. M.	Yes	None given.
Prospect	Not clearly stated.	9 to 12, 1 to 4, 6	During some terms.	Yes	Larger rooms or at least upper (advanced) as we have sixty-five pupils during winter term; I am aware that the manner of seating the upper room is condemned, but we have no trouble with shadows and we get an even and equal warmth for nearly every seat; by the other method we nearly burned those in center rows, and froze those in outer rows. H. O.

(*a*) The suggestions for improvement of present condition are: New site and new school house; the majority of district are unwilling to build new school-house; no privy and no room for any on present site; all of which is entirely unfit for school-house with any number of scholars, and cannot be made so with present location; can local board of health do anything but close school? Please inform me. (See diagram annexed.)

(*b*) The great want of the school-room is better ventilation, including a more equal distribution of heat; severe sickness has not infrequently occurred from neglect on this point; an over-crowded room, an over-heated stove and a broadly open window are of frequent occurrence; I have frequently pointed out these evils, but indifference and ignorance so far prevail; the cubic air space to each scholar is quite too small and can be compensated only by perfect and constant ventilation.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Chenango......	13 frame	1 in each school.	Not given.	Not given.	....	No drainage; privy detached.	By windows.......	By stoves.
Whitestown..............	3 brick............	2 in each school	Not given.	70	....	Unintelligible.........	Ventilators from walls to roofs.	Register; hot air.
Binghamton	9 brick..........	From 6 to 20 in each school.	Not given.	35	....	Connected with sewer; mostly water (sic.).	By warm air flues and windows.	Furnaces and steam.
Suspension Bridge, No. 1.	Very good.	10 in No. 1......	Not given.	48	....	Good drainage, closets in good condion.	Flues and windows..	Stoves.
Southwest Oswego......	Frame	1	Not given.	30 to 35	....	Natural drainage; double closet.	....	Anthracite coal.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Pleasantville	Good:	9 - 12, 1 - 3, 5 hrs.	Yes	Yes	(*a*.)
Richford	In main building side and rear windows; in branch school side windows only.	6	Yes	Yes	Ventilation between upper and lower sash by means of a narrow board under lower sash, is a suggestion for improving present condition; the main building is in the village and has two rooms specified as No. 1 and No. 2; the branch school-house is in a remote part of the district and has one room specified as No. 3.
Pavilion	Seats in room No. 1 face north, in No. 2, east.	9 to 12, 1 to 4. 6	Yes	Yes	There is a recess at 10.30 and one at 2.30.
Himrods	The house stands east and west; three windows on a side and one door of entrance.	8	Yes	Yes	Sell it and move it to the city; (the dimensions are given as 30 by 40 and hardly story high; the reply to "average number of scholars in each class-room" is don't know; attendance varies; the reply to question concerning drainage and closets is "don't know.")
Conquest	Low, old-fashioned wood seats; arrangement not given.	6	Yes	Yes	Present condition is poor, and should advise a new building by all means.
Schuyler's Lake	Back towards the windows.	9 to 12, 1 to 4 5	Yes	Yes	(The cubic dimensions of each class-room are given at 40 feet by 48.)
Clarendon, No. 3	Seats facing south	9 to 12, 1 to 4, 6	Yes	Yes	None.
West Turin	Light at the side and back	6	Yes	Yes	There are eleven schools in district; nearly all of our school-houses are new, with the exception of one or two, which in a short time will be repaired, or new ones built.
Meredith Hollow	Arrangement not given; old-fashion bench seats	9 to 12, 1 to 4, 6	Yes	Yes	(The cubic dimensions of each class-room are given as 18x20.)
Monterey	The room is lighted from the sides and behind.	9 A. M. to 4 P. M.. 7	Yes	Yes	The building is in good condition. (The reply to "cubic dimensions of each class-room" is, "I do not know, but good size."
Tannersville	Very good	9 A. M. to 4 P. M., 7	Yes	Yes	The suggestions for improving present condition are, better ventilation and a new water closet, as the sexes are not at all isolated.
Day	Are as well arranged as possible.	9 to 12, 1 to 4, 6	Yes	Yes	(The cubic dimensions of each class-room are given as 20x30.)

(*a*.) There is a recess of 10 minutes in morning, and in primary ten minutes in afternoon; the building is in good repair; it is suggested to change location of furnace and have improved ventilators; the furnace being under south end of house and pipes vertical, it is difficult to heat north part of rooms; no cellar under north end; ventilation is necessarily bad, only exit for impure air being by windows and chimney flue 3 feet from floor; more room also needed.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. each class room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Harrictstown	Wood, 2 stories ...	Two in village school; one in others.	(a)	30 for upper 60 to 80 in lower.	....	As to drainage this country is 1,500 feet above sea level.	By windows at recesses.	2 wood stoves, capacity, ½ cord each.
Lawrence	Fair in all except two.	One in all but two; in one of these there are two, and in the other three.	From 3,456 to 26,000.	Not given.	....	Drainage, none; character of closets, bad without exception.	By square holes cut through ceiling or by windows and doors (see remarks)	Not given.
Peru, District No. 7......	Old wooden.......	1	5,000	8	625	None..	Top, bottom, sides and ends.	Wood stove.
Peru, District No. 1......	Good; new; wood'n	2	9,456½	37½	252+	Drainage not any, but deep vault in sand for closets.	At top and bottom ..	Coal stove.
Peru, District No. 8	Good stone........	1	6,720	10	672	Drain to the lake..... ..	At the ends	Coal stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Chenango.......	Not given...............	6	Yes.............	Yes......... ...	None.
Whitestown..	Good light from 3 sides.	6	Yes....	Yes.............	(Cubic dimensions of each class-room given as 40x30.) Another teacher wanted to assist.
Binghamton.............	The light comes over left shoulder.	3½ in A. M., 2½ in P. M. 6	In primary schools.	Yes.............	The suggestion for improving present condition is, money enough to follow out needed improvements. (The reply to "cubic dimensions of each class-room" is, "They vary."
Suspension Bridge No. 1..	Windows in the front and back, 3 each; 6 windows on 1 side of room.	5¾	Yes..	Yes.............	The suggestions for improving present condition are, more light and less study. (The reply to "cubic dimensions of each class-room" is, "Don't know the actual dimensions, but rooms are very large."
Southwest Oswego.......	Side light..		Yes.......... ..	Yes............	The recesses are separate for sexes; the building is in good repair; the suggestions for improving present condition are, a double yard and a ventilating stove; we also need new seats — they are old-fashioned wooden ones; the desks too far away and too high, bringing small pupils' books too near the eyes. (The reply to "cubic dimensions of each class-room" is, "About 26x32 in.")
Vestal Centre............	Backs to the east and side lights; none in back or front.	6	Yes.....	Yes..	(*a*.)
Lewiston.......	Facing blackboard in the west, side lights; north and south.	9 to 12, 1 to 4.... 6	Yes......	Yes...........	The method of ventilation is given as "six large windows in each room, north and south; sash slide up and down."
Campbell	Good....................	9 to 12, 1 to 4, 6hs.	Yes.............	Yes........ . ..	(*b*.)
Hornellsville....	Most of the rooms have light over back and left shoulder.	9 to 11.45, 1.15 to 4 5½	None in Park school, there are in the other buildings.	They are by permission.	Would like the new system of ventilation in the other buildings; the school tabulated as 1, is Park school; 2, first ward; 3, fifth ward; 4, sixth ward; the brick buildings are good substantial ones; the wooden one is also good.

(*a*.) There is a recess of 15 minutes in forenoon and in P. M., and one hour at noon; the building is below medium, and new department is being added (16x24); out-buildings should be cleansed and repaired; the average attendance of rooms cannot be given, as the new room is not completed, consequently no change will be made under 60 days. The attendance for the previous school year, I think, is 47.

(*b*.) One improvement I could suggest is, to warm the school building so that the scholars would not die from the result of sitting in cold rooms at school; the house is imperfectly heated and there is water in cellar during a portion of the year; we have one school in this district with an average attendance of 150 pupils; the school contains one class-room (room where classes recite); it contains 4 study rooms, each about 22 by 30 feet; there are in the class-room 12 to 15 at one time; the recesses allowed are of about 5 minutes duration; the location of the building is good, surroundings good.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Southport, No. 3	Wood	1	7,920	12	660	All in a good condition.	By windows	Coal stoves.
Southport, No. 4	Wood	2 {1 {2	11,520 3,872	30 20	384 193†	Are not in a good condition.	One room by a ventilator, one by windows.	Coal stove.
Southport, No. 5, Webb's Mills.	Wood	1	9,216	58	158†	2 closets in good condition.	By windows	Coal stove.
Southport, No. 6	Wood	1	4,320	12	360	In good condition	By windows	Wood stove.
Southport, No. 7. Sage Town.	Wood	1	9,984	35	285†	In a poor condition	By windows	Wood stove.
Southport, No. 8, South Creek.	Wood	1	7,200	15	480	No closets for the scholars.	By windows	Coal stove.
Southport, No. 9, Bird Creek.	Wood	1	10,752	35	307†	All in good condition	By windows	Wood stove.
Southport, No. 10, Mount Zoar.	Wood	1	6,720	10	672	All in good condition	By windows	Wood stove.
Southport, No. 11, The German Hill.	Wood	1	9,360	35	267†	All in the best condition.	By windows	Wood stove.

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Harrietstown	Light behind, on both sides and in front of them.	3 in morning 3 in afternoon, 6 hrs.	Yes	Yes	(a.)
Lawrence	One has light on both sides, others side and back light, except one which has side, back and front light; seats in three are good, remainder are the old fashioned board seats and very hard to sit on.	6, including recess, which is the general custom but 1 school has no recess; the teacher thinks it takes too much time; some defect with him or his training.	As a rule; seems to be governed by the teachers; trustees know but little about the school management.	In every instance where I have been able to converse with the teacher I find they are.	The suggestions for improving present condition are: improvements in ventilation, heating and drainage; seats are also deficient; no means of knowing average number of scholars in each class-room without too much expense; will say the number is too great for the space, unless they have better ventilation; 1 is ventilated by opening in upper part of ceiling from front entryway, but no door so as to force the cold air through said space.
Peru, District No. 7	Seats crosswise, throwing light on front of desk.	6	Yes	Yes	A new closet needed.
Peru, District No. 1	Seats lengthwise and windows at sides.	6	Yes	Yes	There are two clothes-presses attached to school, one 6x7x9½, other 9½x5½x11; nice shape; good condition.
Peru, District No. 8	Seats run lengthwise; windows at sides throw light on desks.	6	Yes	Yes	Everything seems in good condition.
Peru, District No. 17	Seats lengthwise and windows at sides.	6	Yes	Yes	In reply to questions for "cubic dimensions of each class-room," there are dimensions of two small rooms given, 4x9x10 and 4x10x10, which I think are clothes-rooms as there is only one class-room.
Peru, District No. 9	Seats run lengthwise, windows at the sides.	6	Yes	Yes	Everything seems to be in good condition.
Peru, District No. 4	Seats crosswise, throwing light on front of desk.	6	Yes	If so, they forfeit recess.	None given.
Philmont	Light from left side and rear.	6	Yes	Yes	It is evident the flues are inadequate in this case to ventilate the rooms properly; the windows have to be used for this purpose. In reply to what drainage, "No necessity for drainage" is written.
Southport, No. 1, Hendy Creek.	Light from the sides of the desks.	3 A. M., 3 P. M. 6	Yes	Yes	This school-house is in the north-east corner of the town near the mouth of Hendy creek; post-office; the closets should be overhauled and sufficient drainage provided; the building needs some repairs on the inside.
Southport, No. 2, Upper Hendy Creek.	Light from the sides of seats.	3 A. M., 3 P. M. 6	Yes	Yes	This school-house is situated in north-west part of the town near the head of Hendy creek; it has undergone good repairs during the fall; all its arrangements are complete.

(a.) The closets are located against back of building between windows, but because of slope below said windows on south end of building, very bad in summer not so bad in winter; a storm house should be erected in front as scholars have to keep wraps out in cold hall with northern exposure and no fire.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Southport, No. 3	Wood	1	7,920	12	660	All in a good condition.	By windows	Coal stoves.
Southport, No. 4	Wood	2 {1 2	11,520 3,872	30 20	384 193+	Are not in a good condition.	One room by a ventilator, one by windows.	Coal stove.
Southport, No. 5, Webb's Mills.	Wood	1	9,216	58	158+	2 closets in good condition.	By windows	Coal stove.
Southport, No. 6	Wood	1	4,320	12	360	In good condition	By windows	Wood stove.
Southport, No. 7. Sage Town.	Wood	1	9,984	35	285+	In a poor condition	By windows	Wood stove.
Southport, No. 8, South Creek.	Wood	1	7,200	15	480	No closets for the scholars.	By windows	Coal stove.
Southport, No. 9, Bird Creek.	Wood	1	10,752	35	307+	All in good condition	By windows	Wood stove.
Southport, No. 10, Mount Zoar.	Wood	1	6,720	10	672	All in good condition	By windows	Wood stove.
Southport, No. 11, The German Hill.	Wood	1	9,360	35	267+	All in the best condition.	By windows	Wood stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Southport, No. 3	Not given	3 A. M., 3 P. M. 6	Yes	Allowed	This school-house is situated on the river road two miles south of the city of Elmira; the district is small; all its arrangements are good.
Southport, No. 4	Light from the sides of the seats.	3 A. M., 3 P. M. 6	Yes	Yes	This school-house is situated on the plank-road two and a half miles from the city of Elmira, south; the ground around the building is so level that it would be necessary to have pits eight feet deep for each closet; all the rest are in a good condition.
Southport, No. 5, Webb's Mills.	Light on the sides of the scholars.	3 A. M., 3 P. M. 6	Yes	Allowed	As for building, ventilation and drainage — none; the school is too large (think he means small) for the scholars in the district; there should be a class-room 14x16 feet attached to this house; there are sixty-eight iron seats and desks; 2 seats ten feet long, without desks.
Southport, No. 6	Light from the backs of the scholars.	3 A. M., 8 P. M. 6	Are allowed	Yes	(*a*.)
Southport, No. 7, Sage Town.	Light from the sides of the seats.	3 A. M., 3 P. M. 6	Yes	Yes	This school is located in the western part of the town; the arrangements of seats and desks are very poor; the drainage and closets, miserable; it is the intention of the district to put in iron seats and desks, build new closets with suitable drainage, this fall.
Southport, No. 8, South Creek.	Light from the sides of the desks.	3 A. M., 3 P. M. 6	Yes	Yes	This school is situated on South creek in a wealthy district; the building is in a poor condition, both inside and out; without any closets; I would recommend the building to be repaired before commencing winter school.
Southport, No. 9, Bird Creek.	Light from the sides of the seats.	3 A. M., 3 P. M. 6	Yes	Yes	The seats, desks in this school are of wood, in rather a poor condition; I would recommend that they be replaced with those of iron, otherwise the arrangements are good.
Southport, No. 10, Mount Zoar.	Light from the sides of the seats.	8 A. M., 3 P. M. 6	Yes	Yes	This school-house has been repaired during the summer, at an expense of $800; the district is small, but its arrangements are complete; it has wood desks and seats.
Southport, No. 11, The German Hill.	Light from the sides and back.	8 A. M., 8 P. M. 6	Yes	Yes	This school-house is located near the western part of the town, at the German settlement; it is furnished with iron seats and desks; the drainage and closets are all in good condition; the people take pride with their school; it ranks first, in regard to its arrangements, with the schools in this town.

(*a*.) This school is located near the center of the town; no improvements made on the inside since forty years ago this winter, when I visited the school; the seats run on two sides and the back of the house next to the walls, the desks in front, with openings at the ends and middle to let scholars in and out, the whole on a raised platform, six inches high; all should be taken out, and seats and desks in the center.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Waverly	High school of b'k, others of w'd. Grove....	2	8,000	34½	231†	Water closets at High school. In other cases vaults.	In different cases, according to heating apparatus used. In a few rooms not well ventilated.	Stoves, furnaces, and steam in Lincoln street.
	High sch'l	7	10,734 2-7	27½	390†			
	E. Wav'ly	4	11,583	30	386†			
	Linc'n st.	4	12,441	40	311†			
	West end.	1	10,920	45	242†			
Schuylerville...	Three story and basement brick.	6	14,000	49 3-6	282†	Drainage good — closets outside of building.	(*a*)	Four large heaters.
Oxford Village...........	2 district schools good, 1½ story frame. Academy, good 3 story frame	2 in each district school. 1	7,012½	22½	311†	Good natural drainage. Closets mostly in good condition.	School-houses by windows only. Academy mostly.	By stoves — chiefly coal.
		2	8,748	25	319‡			
		3 in academy.	19,718⅛	51⅝	381†			
Memphis.................	An old frame, repaired.	1	7 920	24	330	Drainage none. Double privy in yard.	A seven-inch hole in ceiling back of platform, kept closed to keep out air.	Coal stove in center of room.
Schuylerville	Brick	8 { 5	3,378	45	27†	Building built on rock; no cellar; foundation drained and dry; closets 30 feet from main building, very poor and not drained.	Modern improved ventilation.	4 heaters on general floor; hot air pipes in walls; registers mostly at top of room, foul air leav. at the top.
		1	28,000	65	40†			
		2	13,378	15	81†			
Canandaigua Village......	Brick	In one 11, in each of the others 2. (8 schools.)	11,200	38	204†	Drainage of two buildings good, the others not so good, yet no water in cellars; closets have vaults, cleaned every two years.	In main building by ventilating flues heated by steam pipes in cold weather; smaller buildings by windows opening at top and bottom.	Main building by steam, direct and indirect; in two smaller by coal stoves.
Cherry Valley............	Frame	3 { 1	21,000	40	525	Closets three rods away and not drained.	Doors, windows and a flue.	Stoves.
		1	21,000	50	420			
		1	4,160	30	138†			

(*a*.) From basement through roof, heated by two air shafts, pipe passing through bottom, and open registers connecting from each room.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Southport, No. 12	Light on the sides of the seats.	8 A. M., 3 P. M. 6	Yes	Yes	This school-house is located in the south-west part of the town; the outside of the building is good; the arrangements for seats and desks need repair; new closets with proper drainage are very necessary.
Southport, No. 13	Light from the sides of the seats.	8 A. M., 3 P. M. 6	Yes	Yes	This school is located near the center of the town (known as Christian Hollow); all of its arrangements are complete; it ranks as one of the first in the town as to building, closets and drainage.
Southport, No. 14, South Creek.	Light both back and on sides of the scholars.	8 A. M., 3 P. M. 6	Yes	Yes	This school-house is located in the south-east part of the town, on South creek, near the Pennsylvania State line; all of its arrangements are complete; the inhabitants take pride with their school.
Southport, No. 15, Pine City.	Light from the sides of seats.	8 A. M., 3 P. M. 6	Yes	Yes	This school-house is located at Pine City (Post-office); the building has a small tower with a bell; all of its arrangements are in a good condition.
Southport, No. 16, Dry Run.	Light from the sides of the seats.	8 A. M., 3 P. M. 6	Yes	Yes	The school-house is near the south part of the town; its arrangements are all in the very best of condition.
Southport, No. 17	Each room is lighted from the sides.	8 A. M., 3 P. M. 6	Yes	Yes	This school-house is located in the north part of the town, called South Elmira; it is a two-story building, the rooms all properly arranged; supplied with iron seats and desks, with one principal and five assistant teachers; the closets and drainage are all in the best of order; it ranks with any of the district schools in the city.
East Aurora	Windows at pupils' back and sides.	6	Yes	Yes	The reply to question concerning drainage and closets is, "Very little attention paid to closets it being a country place."
Fair Haven	Side light upon both sides in all cases; light in front in all but one case.	6	Yes	Yes	(a.)
Niagara Falls	Side lights	5½	Yes	Yes	Larger ventilators should be put in; the main ventilation is by the windows; in the summer the windows are open most of the time, but in winter, on account of draughts, they are open but little, consequently the rooms become very close and the air unfit for respiration.

(a.) The stoves give off a great deal of coal gas; there are recesses of from ten to fifteen minutes in morning and afternoon; the suggestions for improving present conditions are: Increase of air space, improved ventilation, heating and lighting; State Board of Health should secure legislation which will make it obligatory upon all school districts to provide buildings which shall furnish sufficient air space for the pupils, with proper lighting, ventilation and heating; these matters should no longer be left for performance to the caprice of the inhabitants of a school district.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Rodman	Wood, in good repair.	2 { 1	8,671	25	246†	Two earth closets; drainage good; situated on elevated ground.	By flue from basement to top of building, and registers near floor on sides.	By jacketed wood stove in each room and register in floor to admit cold air.
		2	6,974	27	258†			
Centerville	Wooden	2 { 1	10,363	27	383†	Closets wooden, very poor.	Method not clearly stated.	By stoves similar to figure in school hygiene.
		2	5,049	26	194†			
Valley Falls	Fair wooden	3 { 1	7,050	50	141	Closets are 6 feet deep in gravel, 30 feet from building.	No ventilation except by windows.	By stoves.
		2	8,000	55	145†			
		3	12,400	45	275†			
Sandy Hill	{ 1 brick	7	16,209 4-7	49 3-7	327†	Very little drainage; closets are closed vaults.	Shafts from each room.	Stoves, coal and wood.
	1 wood	1	14,500	52	278†			
	1 wood	1	13,500	42	321†			
Peru, District 11	New wooden	1	4,275	9	475	Have none	Not given	Wood stove.
Peru, District 14	Wooden	1	4,105½	10	410†	No drainage; on side hill.	At bottom	Wood stove.
Peru, District 2	Wooden	1	7,500	24	312†	None	Top and bottom	Wood stove.
Peru, District 19	Good wooden	1	5,313	16	332†	No drainage; deep vault for closet.	At top	Coal stove.
Peru, District 13	Old wooden	1	2,470	9	274†	Ditch ten rods long	Top	Wood stove.
Peru, District 3	Wooden	1	6,000	15	400	None	All around	Wood stove.
Peru, District 16	Wooden	1	4,837.5	14	345†	No drainage; deep vault for closet.	At the ends	Wood stove.
Peru, District 5	Wooden	1	3,956	13	304†	None	At the top	Wood stove.
Lee Centre	Frame	3 { 1 and 2 each.	14,400	30	480	No drainage, soil gravelly; closets frame and about 20 feet distant from school building.	Not well	Coal stoves.
		3	26,800	Not given.	....			
Galway	Good wooden	2	7,000	40	175	Drainage good; closets *none*.	Ventilators in the ceilings.	Wood stoves.
Cassadaga	Old	1	8,424	35	240†	Closets old; house situated on hill.	No ventilation	Wood stove.
West Fulton, Dist. No. 1.	Fair	1	6,250	45	138†	Drainage good; closets fair; closets 20 feet from building.	By windows	2 wood stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Waverly	East Waverly building, light comes in at side on the left. On both sides in the other buildings.	8.50 to 11.45 A. M. 1.30 to 4.15 P. M. 5 hrs. 40 min.	In primary schools.	Yes	The study rooms in some cases are used for recitations. In all the rooms heated by stoves the "jacket" would improve the condition. The window board would be of some help. The premises are all so located that the vaults cannot be replaced by the water closet. Streets not being sewered.
Schuylerville	Back and side light	9 to 12. 1.15 to 4. 5¾	Forenoon only.	Yes	Upper story of building is an unfinished hall. The suggestion for improving present condition is, water closets.
Oxford Village	Side and back light	6 hrs. except primary of ac'y 5¼.	Yes	Yes	The suggestion for improving present condition is, that better ventilation be provided in both district buildings.
Memphis	Face north, windows on side, one back.	8 A. M., 3 P. M. 6	Yes	Yes	Burn the old shell and build something decent. This school has been run by a clique to satisfy personal ends, which possessed neither principle, honor nor brains. A large amount of money has been expended without any definite plan in reference to sanitary laws, or comfort of children. The great point seemed to be to get rid of money. One-half of our country schools are in the hands of those least competent to run them. I have, and still take a great interest in these "colleges of the poor people."
Schuylerville	Light from rear and 1 side in 7 rooms, regulated by inside blinds; large room lighted on opposite sides; no scholar faces window.	Morning 3 hours, afternoon 2⅓ hours, 5⅓ hrs., one hour less Fridays.	20 minutes in forenoon only.	Yes	Three floors are occupied; floors 68x72 each; closets should be drained, ventilated, disinfected and kept in good sanitary condition.
Canandaigua Village	Mostly with light at side, others at back.	5⅓ hours, including 20 minutes spent in recesses	One in each half day.	Yes	The rooms open into halls that are closed from outside draughts; average hall space per room 3,248 cubic feet; present condition cannot well be improved save by a general system of sewerage now in process of construction; in the upper and high portion of the village, but not in this district, there is another substantially built brick building of about same capacity and corresponding in other respects with those already described.
Cherry Valley	One study room; seats face the light; the other back.	9 to 12, 1.15 to 4.15. 6	Yes; at the middle of each session.	Yes, generally	Windows ought to be smaller and more; seating ought to be changed so that the light is not reflected directly to the eye: fresh air should be conducted from outside directly to the stove or furnace; windows ought to be hung on weights; inside window-bench ought to be 8 in. higher than outside; blackboards ought to be replaced or have a new surface-stone; shades ought to be put up at windows.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Fulton, Morey Hill, District No. 3.	Frame	1	3,960	15	264	No drainage; closets small and inconvenient	By windows.........	Wood stove.
Patria, District No. 9.....	Frame	1	5,184	25	207†	No drainage; one small vault 20 feet from school house.	From top and side; with four flues.	With a stove and 20 feet pipe.
Fulton, Adams Hollow, District No. 10.	Frame	1	1,920	15	128	No drainage; good closet.	By windows.........	One stove 20 feet pipe.
New Lebanon....	Brick	2 { 1 2 { 2	10,044⅜ 7,919 5-6	21 40	478† 197†	No drainage; buildings detached from school building.	By open windows and doors.	By stoves.
Coxsackie	Both brick, in excellent condition.	12 in one, and 1 in the other.	9,000	45	200	Perfect drainage; Smead dry closets.	By Ruttan-Smead system.	By Ruttan-Smead system
Greenport	Frame	8	9,234 47-72†	48⅝	190†	Surface drainage; closets about 100 feet from building.	By windows and transoms.	Steam.
Jamestown............	{ 5 brick.......... { 2 wood..........	30 in all the schools.	9,660	51	189†	Deep stone vaults for the closets.	With registers in or near the floor into ventilating flues.	By steam boilers, by hot-air furnaces and by coal stoves.
Shelby Center............	New, brick........	2 { 1 2 { 2	17,248 8,372	30 35	574† 249†	Good drain; tile running to old mill race.	Flues above and below.	Coal stoves.
Coxsackie, Urlton, District, No. 8.	Frame (medium)..	1	3,094	18	168	Not given.....	Not given...........	Wood stove.
Franklinville	Academy, stone...	5	7,000	35	200	No drainage or inside closets to any of them.	No ventilation in any except by windows	Academy heated by coal stoves, all others by wood stoves.
	village school, wood.	3	8,000	30	266†			
Greene..................	Both frame........	2 in one, 3 in other.	5,298 16,878⅜	43 50	123† 337‡	No drainage; water-closets; vaults.	(a)	(b)

(a) Primary department building, by flues from floor o a garret above, flues 6x10 inches; in the Intermediate and Grammar departments by openings in the ceiling about 8x12 inches, opening from one room into the library above, and from the other into the cloak room; air is let into the rooms by opening the windows and by transoms over the doors; the Academic department has no ventilation, whatever, except by openings through the ceiling into the garret and these are generally closed; in fact these three rooms may be said to have no means of ventilation; only a way of escape of heat, and all the pure air is let in by the windows.

(b) The primary department is heated, both rooms, by a furnace; the Grammar and Intermediate departments each by 1 stove, the Academic department by 2 stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangements of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Rodman	Seats face the east side where there is one window in each room.	5 hours with noon day intermission of one hour.	No	They are in the primary department.	The suggestions for improving present condition are, painting ceiling white; have seats face the south; building fence between water-closets of male and female departments from moral reasons.
Centerville	Windows at the sides or ends of seats.	8	Yes	Yes	The suggestion for improving present condition is. good privies or closets; ventilated from base by opening between sealing and ——.
Valley Falls	Side lights except in higher department, side and front.	2½ hours, morning and afternoon. 5	No	Yes	The suggestion for improving present condition is, addition of ventilators; a new school-house is really needed, but probably cannot be obtained in less than 2 years. In the meantime a fourth department ought to be added; for which there is an unfurnished room.
Sandy Hill	Light generally comes from back and side.	9 to 12, 115 to 3.30 5¼	No	Yes	The suggestion for improving present condition is, a better system of ventilation.
Peru, District 11	Crosswise, throwing light on front of desk.	9 to 12, 1 to 4 6	Yes	Yes	The suggestion for improving present condition is, that they build a new closet.
Peru, District 14	Crosswise, throwing light on front of desk.	9 to 12, 1 to 4 6	Yes	Yes	Everything seems to be in good shape.
Peru, District 2	Crosswise, throwing light on front of desk.	9 to 12, 1 to 4 6	Yes	Yes	The suggestion for improving present condition is, that they have a drain to the closet.
Peru, District 19	Lengthwise and windows at sides.	9 to 11.45, 12.45 to 3.30. 5½	No	Yes	Everything in nice shape.
Peru, District 13	Crosswise, throwing light on front of desk.	9 to 12, 1 to 3.30 5½	No	Yes	None given.
Peru, District 3	Seats lengthwise and windows at sides.	9 to 12, 1 to 4 6	Yes	Yes	The suggestion for improving present condition is, build a new closet.
Peru, District 16	Seats crosswise, throwing light on front of desk.	9 to 12, 12.30 to 3.30 6	Yes	Yes	None given.
Peru, District 5	Crosswise, throwing light on front of desk.	9 to 12, 1 to 4. 6	Yes	Yes	The suggestion for improving present condition is, that they have a drain to the closet.
Lee Centre	Seats in front of light and side.	6	Yes	They are at any and all times.	The suggestions for improving present condition are, better ventilation and vaults for closets.
Galway	Lighted by windows on right and left of desk; each desk gets light from both sides.	9 to 12, 1 to 4 6	Yes	Yes	Water closets should be immediately built with separate compartments for boys and girls.
Cassadaga	About two windows on a side.	6	Yes	Yes	Two recesses a day are allowed; the suggestion for improving present condition is, new school building.
West Fulton, Dist. 1	The seats are at right angle with the windows	6	Yes	Yes	The suggestions for improving present condition are, ventilation. Closet should be farther from building.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Diana	Wooden....... ...	2	7,425	47	157†	Natural drainage; play-grounds are drained.	By windows and doors.	2 stoves in each class-room
Hoosick Falls...........	Good buildings in good order.	4 11 9	11,626† 9,056† 9,213†	50 50 50	232† 181† 184†	Not given	By ventilating flues and ventilators near the floor.	Steam and hot air.
Four Mile Point, Coxsackie, District 10.	Good	1	4,935†	26	189†	Good	By opening windows and doors.	By a good stove
Port Henry	Both brick, in good repair.	One has... 1 Other has.. 7	4,325 9,367 2-7	45 53 6-7	96† 173†	Surface drainage; ground hard and sloping; closets out-door, 3 or 4 rods away from school-house.	All rooms by registers in walls; one at bottom and one at top, from 6 to 12 inches square.	First by one large stove near one corner; the large building by furnace and hot air pipes.
Owasco, District No. 1...	Stone	1	4,800	23	208†	Stone drains; wooden closets, with two apartments.	By lowering top windows; by windows.	Coal stove.
Owasco	Brick	2 { 1 2 { 2	9,408 5,280	40 30	235† 176	Closets detached from building.	By tubes from near the floor to roof.	Wood stoves.
Owasco, District No. 3...	Frame	1	8,400	35	240	Drainage good; closets frame with cellar.	By windows alone.	Coal stove.
Owasco, District No. 4...	Frame	1	8,400	16	525	Drainage poor; closet 30 ft. rear of school-room.	By windows.	One coal stove.
Owasco, District No. 5...	Brick	1	4,950	12	412†	No drainage; the privies are independent of the house.	Fairly.	By stoves.
Owasco, District No. 6...	Wood, in good repair	1	6,684	8	836	Privy outside of house and in good condition.	By windows.	By a large coal stove.
Owasco, District No. 7...	Wood............	1	4,840	15	322†	Good	One ventilator overhead.	Wood stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Fulton, Morey Hill, District, No. 3.	Arranged so light comes in from right and left.	7	Yes	Yes	The building is quite small and has one hall; the 7 hours of school include noon intermission and recesses; the suggestion for improving present condition is, should have a new closet.
Patria, District No. 9	Five rows of seats with 2 windows on each side.	3 forenoon, 3 afternoon, 6 hrs.	Yes	Yes	Building is in good condition; closet should be 100 feet from school building.
Fulton, Adams Hollow, District No. 10.	Side light	6	Yes	Yes	The building is in good repair; the suggestion for improving present condition is, proper ventilation.
New Lebanon	With backs to windows	6	Yes	Yes	Building is two-story, upper used for R. room.
Coxsackie	Lighted from left and rear.	9 to 11.45, 1.15 to 4 5½	No recesses	Whenever they wish.	The suggestion for improving present condition is, shorter hours, at least for the afternoon; the large building is constructed according to the most approved modern ideas of school architecture and hygiene.
Greenport	Light at back and side with screens on all but north side.	Lowest primary, 4 hrs; primaries, 4½ hrs.; rest of school, 5 hrs.	No	Yes	The principal defect is in ventilation although this is fair compared with country schools, generally, there being transoms over the doors leading into spacious halls; an unfinished third story, and an opening to the air through bell tower; the building has 3 stories and 8 finished rooms.
Jamestown	Uniformly from the rear and sides.	From 5 to 5½ hrs.	Yes	Yes	So far as my observation goes, I must say that the schools are in first-class sanitary condition in every respect.
Shelby Center	Windows on two sides (good light).	9 to 11.30, 1 to 4. 5½	Yes	Yes	Building is in good condition; clothes room is in cellar-way above trap door; not a very good place, although dry; cellar in good condition; closets in good condition.
Coxsackie, Urlton, District, No. 8.	Windows on all four sides of the building and the seats one on each side.	6	Yes	Not given	None given.
Franklinville	Academy, cross-lights; village school, light from side and back.	Academy 5½ hrs; all others 6 hrs.	Academy no recesses except noon; in others recesses allowed	Yes	Light in other schools not known, probably no attention given to direction of light; there are twelve schools in Franklinville and seven in Humphrey, but data are only given of the academy and village school in town of Franklinville; all other schools have but one room.
Greene	Light to back and left side.	2 hrs, 45 m. A. M., 2 hrs, 15 m. P. M., 5	In primary b'ld'g yes; in intermediate, grammar and academic departments, no.	Yes	(a.)

(a) The building with two rooms is the primary building, the other has 3 rooms, Intermediate, Grammar and Academic; this building needs a thorough overhauling; it is a great source of colds and kindred diseases during the winter months, more so in the early spring; I have endeavored to induce our board to put in furnaces, and take measures for proper ventilation, but so far without success; it could not be in a worse condition than it is at present.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Springfield, District No. 1,	Wood; poor	1	7, 200	20	360	Drainage natural; closets poor.	By windows & door.	Wood stove.
Springfield, District No. 2,	Wood; poor	1	3, 840	24	160	Low and muddy without drain; closets poor.	By doors & windows and scuttle in wall.	Wood stove.
Springfield, District No. 3,	Wood; poor	1	3, 840	14	274†	Drainage natural but good; closets poor.	By doors & windows.	Wood stove.
Springfield, District No. 4,	Stone; good	1	5, 312½	12	442†	Drainage natural; closets good.	By door and scuttle in wall.	Wood stove.
Springfield, District No. 5	Wood; good.	1	8, 064	12	672	Drainage natural; closets good.	By windows.........	Wood stove.
Springfield, District No. 6	Wood and good...	1	6, 336	36	176	Drainage natural; closets good.	By door, windows, scuttle in wall.	Wood stove.
Springfield, District No. 7	Wood; poor.......	1	3, 840	18	213†	Drainage natural; closets poor.	By door and windows.	Wood stove.
Springfield, District No. 8	Wood; wants repairing.	1	5, 148	14	367†	Drainage natural; closets, not any.	By windows and door	Wood stove.
Springfield, District No. 9	Wood and fairly good.	1	5, 376	15	358†	Drainage natural........	By door, window, scuttle in wall.	Wood stove.
Springfield, District No. 10	Wood and good...	1	7, 200	18	400	Drainage natural; closets good.	By door and windows	Wood stove.
Springfield, District No. 11	Wood; poor......	1	7, 840	20	392	Drainage natural; closets poor.	By door and windows and scuttle in wall.	By coal.
Springfield, District No. 12	Wood and good...	1	13, 200	40	330	Drainage natural; closets good.	By door and windows and scuttle-hole.	By coal and wood.
Springfield, District No. 13	Wood; good......	1	5, 280	20	264	Good	By door and windows.	Wood stove.
Kinderhook	Brick, new building.	2 { 1 { 1	11, 260 6, 250	40 40	281† 156†	Closets separate from building, vaults.	By registers in wall.	By furnace.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*)

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Diana	Windows on back and sides.	9 to 12, 1 to 4 6	Yes	Yes	Seats are very hard for children and too small for number of pupils; the grounds need cleaning off and to be made smooth, and needs another privy, only one for 94 pupils, and no drainage for that.
Hoosick Falls	Light comes in at the side or back or both.	9 to 11.45, 1.15 to 3.30, 5 hours; primary 1.15 to 2.30, 4 hours.	Individual recesses are allowed & recreation is given in the school-room	Yes	None given.
Four Mile Point, Coxsackie, District 10.	Good	6	Yes	Yes	The school-house is to be banked and then everything will be in perfect order.
Port Henry	Three have windows on north and south sides; seats face east; the rest have windows on one side and at back.	9 to 12, 1 to 4, 6	Yes	Yes	None given.
Owasco, District No. 1	Windows east, west and north; seats facing south.	9 to 12, 1 to 4, 6	Yes	Yes	The suggestion for improving present condition is a new school-house.
Owasco	Windows on three sides; scholars face the fourth side.	9 to 4 7	Yes	Yes	None given.
Owasco, District No. 3	Windows at sides and back of seats.	6	Yes	Yes	The ventilation is poor; it should, I think, be better ventilated than simply by raising or lowering windows, which causes draught; also new furniture is needed, especially for teachers; building includes school-room and coal-house.
Owasco, District No. 4	Windows on all sides of seats.	8	Yes	Yes	There ought to be better seats in school-room, and better drainage for lot and around school building.
Owasco, District No. 5	Seats run north & south; light from north and south.	8 A. M., 3 P. M., 6	Yes	Yes	None given.
Owasco, District No. 6	Windows are 2 on either side, east and west; seats run east & west.	9 to 12, 1 to 4, 6	Yes	Yes, as often as desired.	I do not know of any artificial drainage; there is one recess in forenoon and one in afternoon.
Owasco, District No. 7	Two windows at each end of seats and two at the back.	9 to 12, 1 to 4, 6	Yes	Yes	None given.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued.*)

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Coxsackie, District 9.....	Very poor.........	1	3, 360	24	140	Drainage none; closets need cleaning.	With holes..........	Wood stove.
Coxsackie, District 4.....	Frame	1	2, 960	11	269†	Not given............ ..	By windows and door.	By coal stove near middle of room.
Boonville	Not given.........	Report says 7, but dimensions of only 5 are given.	28, 372 8, 875 8, 875 3, 094 3, 094	95 45 52 33 65	298† 197† 170† 93† 47†	Poor	By ventilators in walls.	By furnaces.
Mecklenburg	Plain wood building.	1	22, 500	60	375	Natural slope; closets fair.	By windows	Coal stove.
Coxsackie, District No. 6.	Very good; wooden building.	1	15, 600	55	283†	Good...................	By windows.........	With stoves.
Nyack	Main school, brick; branch school, frame.	14 1	10, 938 6-7 8, 100	50 36	218† 225	All drain pipes connected with a sewer that empties in Hudson river; the water closets (two in number) are outside of the building; the vaults are brick and cemented water-tight, are connected with sewer; each closet is flooded every day with water and emptied and washed out every night.	By registers; general plan very poor; school trustees devising new plans; part of building very poorly ventilated, and needs attention at once.	Hot-air furnaces.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Coxsackie District 9	Seats with faces to windows.	6	Yes	Yes	There are narrow benches without backs. A recess of ten minutes during each three hours session is allowed. The suggestion for improving present condition is, a new house with a school yard and the necessary out buildings for comfort; I wish we could get a new house for the purpose of education and health.
Coxsackie, District 4	They are lighted on the right and left sides and in front.	9 to 12, 1 to 4. 6	Yes	Yes	The suggestion for improving present condition is, tear down this building and build a new one; building has no cloak-room.
Boonville	Arranged so that the light is at back or sides.	6	Yes	Yes	No suggestions for improving present condition are offered, but improved drainage; building has good light and good ventilation.
Mecklenburg	Windows at sides; scholars sit lengthwise.	6	Yes	Yes	(*a*)
Coxsackie, District No. 6.	Lighted from both sides by windows.	6	Yes	Occasionally	The suggestion offered for improving present condition is, to enlarge the school building.
Nyack	No special arrangement; generally from the side.	5½	Yes; one	Yes	(*b*)

(*a.*) There is a small recitation-room in building containing 2,016 cubic feet; there is one recess in forenoon and one in afternoon; the windows each side face east and west, and as there are no shades the intense afternoon sun beats in the room to the great annoyance and injury of pupils; the stove heat renders four seats useless and needs a screen to break it from other seats to make them tolerable; I have had complaints made against the unsanitary condition of our school-houses, and, on investigation, found grave cause for them; as far as my knowledge extends the sanitary condition of our schools is not good; the foundation walls of many are bad, stones out in some places and loose in others, allowing the wind full sweep under them; the weather boards are in the same condition; the flooring in some is laid on top of other worn out floors, and to level it from the inequality of wear and knots, one-half inch strips are laid crossways; the cracks are so large as readily to admit between the floors all the various accumulations that will get in a school-house, pieces of food from their lunch, shucks and pieces of nuts, chalk, straws, grain of all kinds, cotton and woolen fibre, from clothing, while the "tracking" from the boots and shoes makes a composition of various ordures fit only for a poudretté factory; all these, when dried, everytime the floor is swept, accumulate under the floor, and from the jar of foot-steps the air of the room is filled continually with this filthy dust; if the floor is scrubbed only the upper boards are cleaned, and the lower ones get most of the water where it mixes with the foul debris and remains until evaporation removes it; the out-houses of nearly all the schools are in a neglected condition; there is no separation for the sexes and they are rarely if ever cleaned out; the seats are broken and the doors of many are gone; the majority of the school buildings in this town are the plain old fashioned "Red School House" style, and that needs no technical description to any one that has lived in the country.

(*b.*) The main school has stone stairs; the general system of ventilation should be improved at once; teachers open and close the windows during school hours, which causes sudden changes in the temperature, thereby endangering the health of the children; the room in the branch is also very poorly ventilated; part of the main building is new, rooms in this part are being finished for use as needed.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Smyrna	Two stories wooden, with blinds; painted white (blinds green), walls plastered.	2	5,400	34½	156†	Closets 30 feet from corner of house, upon site sloping from building; drainage good; grounds slope from house in all directions.	A 14-inch round register in center of each room communicating through floor to room same size above (alike in each room); windows raise to allow ventilation between sash.	Wood stove in juvenile room; coal stove in advanced room.
Churchville	Stone; poor.......	3	17,500 8,750 8,750	40 50 35	437† 175 250	No drainage; closets wood, attached to main building.	No ventilation except by windows.	By stoves.
Fort Covington	Wood; two stories	6 {2, 2, 1, 1}	13,440 7,560 11,760 3,094	45 35 65 17½	298† 216 180† 172†	Drain runs to Salmon river; closets on surface; contents carted off.	Through chimney by means of registers.	By hot-air furnace.
Livingstonville...........	Wood; in good repair.	1	5,760	18	320	No drainage; closets separate; building about 30 feet from house; closet well drained.	By ventilator in ceiling.	By wood stove.
Kingston	All brick, except one — concrete; 8 schools.	In all 53	8,566	43¼	198†	Cess-pools outside; brick	Air flues in chimneys and by windows.	By hot air and steam.
Corinth	Not given....	2	5,100	47½	108†	Closet is about six feet by twelve, with a partition through the middle with drawer underneath.	No ventilation except by windows, which are made to let down.	By wood fire.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Smyrna	Light to back and sides.	9 to 12; 1 to 4 6	Yes	Yes	There are two rooms on second floor not occupied, same size as those on first floor, are 8 feet high, but are not furnished; the seats are W. W. Chase's improved folding seats. There is a recess of 15 minutes at 10.30 A. M., and one of 15 minutes at 2.30 P. M. The suggestions offered for improving present condition are, jacket the stoves, as fig. 3 in "School Hygiene," and placing a register in the cold-air pipe; the floor is about 3 feet from ground, and a good wall under the building; I think the heating is the poorest feature, as some seats are so near the stoves; otherwise, I think we are fortunate although we see there is really lack of space and insufficient ventilation. I trust you will, if in your judgment advisable, order the board of trustees to "jacket" the stoves if nothing more. It is of vast importance that pure air be secured, and some method of providing it be enforced; hardly a school-house in this township is fit for the use intended (a broad statement, but true). I wish the State Board of Health were clothed with power to order all needed improvements in our school-houses; there will be more scholars during winter.
Churchville	Light on one side and back of scholars.	5 hrs. and 20 min.	No	Yes	The suggestion offered for improving present condition is, build a new school-house; the subject of building a new or repairing the old school-house has been agitated this fall, new grounds for the closets have been purchased, and land for play-room has been leased, and the prospect now seems to indicate that another year our school-house will be very much better than now.
Fort Covington	Lighted from side and behind seats.	6	Yes	Yes	None given.
Livingstonville	Windows to back and sides of seats.	9 to 12; 1 to 4 6	Yes	Yes	
Kingston	Light generally from rear of pupils.	9 to 12, 1 to 3, 5	Yes	Yes	No suggestions are offered for improving present condition, except it be a system of general city sewerage.
Corinth	In the front room the seats have light from both sides; the back room is well lighted on three sides.	6	Yes	Yes	The general opinion, so far as I've talked with residents of the district, is that a new school-house is needed, the building is one story, about fifty-two feet in length and twenty-five in breadth.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
West Town	Frame; 2 story	2	6,264	27	232	Common country water closet.	By windows	By coal stoves.
Sloatsburg, Rockland Co., District No. 1.	Frame	1	22,500	70	321†	Partly to the building; privies.	By windows	One coal stove.
Ramapo, Rockland Co., District No. 2.	Frame	1	25,000	66	378†	All from the buildings; privies.	By windows and by holes through the walls.	By two large stoves.
Suffern, Rockland Co., District No. 3.	Frame	2 { 1 1	15,840 6,400	53 35	298† 182†	From building; privies	By windows	Two stoves.
Tallmans, Rockland Co., District No. 4.	Frame	1	4,992	24	208	From building; privies in rather poor condition.	By windows and transom over the door.	One stove.
Monsey, Rockland Co., District No. 5.	Frame	1	12,936	35	369†	From building; privies	By windows	One coal stove
Red School House, Rockland Co., District No. 6.	Frame	1	8,000	19	421†	From building; privies	By windows	One stove.
Spring Valley, Rockland Co., District No. 7.	Frame	4 { 1 1 1 1	20,179 20,179 30,268 10,080	20 20 60 60	1,008† 1,008† 504† 168	Partly from the building, excepting during the spring; privies.	By windows	Four stoves.
Brick Church, Rockland, Co., District No. 8.	Frame	1	14,112	32	441	From building; privies	By windows	One stove.
Viola, Rockland Co., District No. 9.	Frame	1	11,664	30	388†	From building; privies	By windows	One stove.
English Church, Rockland Co., District No. 10.	Frame	1	12,960	25	518†	From building; privies	By windows	One stove.
Pomona, Rockland Co., District No. 11.	Frame	1	3,768	23	163†	From building; privies	By windows	One stove.
Camp Hill, Rockland Co., District, No. 12.	Frame	1	7.722	14	551†	From building; privies	By windows	One stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
West Town	Backs to the light	6	Yes	Yes	Better means for ventilation should be employed.
Sloatsburg, Rockland Co., District No. 1.	Seats arranged at right angles to windows.	9 A. M., 4 P. M., 7	Yes	Yes	The building is in good condition; the heating could be improved by a suitable apparatus; also, the ventilation should be improved; privies should be cleaned more frequently; the drainage should be improved.
Ramapo, Rockland Co., District No. 2.	Seats at right angles to windows.	9 A. M., 3 P. M., one-half hour at noon time, 5½ hours.	No	Yes	The building is in good condition; everything in good condition, excepting that the ventilation should be improved, and also privies; privies not cleaned often enough; there are two small rooms of 1,260 cubic feet each, which are used to recite in.
Suffern, Rockland Co., District No. 3.	At right angles to windows.	9 A. M., 3.30 P. M., one-half hour at noon time, 6 hrs.	One in morning	Yes	The building is in good condition; ventilation could be improved; also privies.
Tallmans, Rockland Co., District No. 4.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in fair condition; the suggestions for improving present condition are, an apparatus for ventilating the room, and the privies should be cleaned more frequently.
Monsey, Rockland, Co., District No. 5.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in fair condition; ventilation defective; privies should be cleaned more frequently.
Red School House, Rockland Co., District No. 6.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in rather poor condition, it should be repaired. The proper way would be to build a new building; ventilation defective, also privies, not cleaned often enough.
Spring Valley, Rockland Co., District No. 7.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in good condition; ventilation defective, also privies; the privies not cleaned often enough.
Brick Church, Rockland Co., District No. 8.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in good condition; ventilation defective; privies not cleaned often enough; the drainage from a grave yard contaminates the water in the well, and it should be remedied as soon as possible, the well being situated at the foot of a hill below the grave yard.
Viola, Rockland Co., District No. 9.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in good condition; ventilation defective; privies not cleaned often enough.
English Church, Rockland Co., District No. 10.	At right angles to windows.	9 A. M. to 3.30 P. M. ¾ hr. at noontime 5¾	Yes	Yes	The building is in good condition; ventilation defective; privies should be cleaned more frequently.
Pomona, Rockland Co., District No. 11.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in fair condition; ventilation defective; the privies are in very bad condition.
Camp Hill, Rockland Co., District No. 12.	At right angles to windows.	9 A. M. to 3.30 P. M. ½ hr. at noon, 6 hs.	Yes	Yes	The building is in good condition; ventilation defective.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita	Closets and drainage.	Ventilation.	Heating.
Tallmans, Rockland Co., District No. 13.	Frame	1	12,150	20	607½	From building; privies..	By windows.........	One stove.
Saddle River, Rockland Co., District No. 14.	Frame	1	4,536	22	206 2-11	Drainage to the building; privies.	By windows.........	One stove.
Hilburn, Rockland Co., District No. 15.	Frame	2	17,370	35	496†	From building; privies..	By windows and registers in ceiling.	By furnace and two stoves.
Peru, Clinton Co., District No. 12.	Old wooden	1	7,600	15⅓	495†	None...................	Top, bottom and side	Wood stove.
Peru, Clinton Co., District No. 15.	Old wooden... ...	1	3,800	12	316†	Haven't any closet	Not given...........	Wood stove.
Peru, Clinton Co., District No. 10.	New wooden......	1	6,118⅝	17	359†	None	At top; roof of......	Wood stove.
Peru, Clinton Co., District No. 6.	Wooden..........	1	6,090 20-27	20	304†	None	Front and back are all out, in bad shape.	Wood stove.
Van Buren, Dist. No. 1...	Wood........ ...	1	6,160	25	246†	No drainage; closets separate and decent.	Trap in ceiling.....	Stove.
Van Buren, Dist. No. 2...	Wood............	1	6,060	22	275†	No drainage; closets double and decent.	None	Coal fire.
Van Buren, Dist. No. 3...	Wood............	1	8,671	16	541†	No drainage; closets separate and decent.	Trap in ceiling......	Stove.
Van Buren, Dist. No. 4...	Wood......... ...	1	7,392	16	462	No drainage; closets double and filthy.	None but doors and windows.	Wood stove.
Van Buren, Dist. No. 5...	Wood............	1	5,130	23	223†	No drainage; closets double; partition between; bad.	None	Coal stove.
Van Buren, Dist. No. 6...	Wood............	1	3,964	23	172†	No drainage; closets double; board partition between.	By windows and doors.	Coal stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Tallmans, Rockland Co., District No. 13.	At right angles to windows.	9 A. M., 3.30 P. M., ½ hr. at noontime 6	Yes	Yes	Building not in very good condition; ventilation defective; also privies not cleaned often enough.
Saddle River, Rockland Co., District No. 14.	At right angles to windows.	9 A. M. to 4 P. M., 7	Yes	Yes	The building is in fair condition; the ventilation is defective; also privies; the drainage should be attended to; the seats in the school building are not made for comfort, and should be replaced by seats and desks with modern improvements.
Hilburn, Rockland Co., District No. 15.	At right angles to windows.	9 A. M. to 3 P. M., ½ hr. at noontime 5½	Yes, one in morning.	Yes	The building is in good condition; ventilation defective; also privies; not cleaned often enough.
Peru, Clinton Co., District No. 12.	Seats crosswise, throwing light on front of desk.	9 to 12, 1 to 4, 6	Yes	Yes	The whole thing in bad shape; promise to build new this spring.
Peru, Clinton Co., District No. 15.	Seats crosswise, throwing light on front of desk.	9 to 12, 1 to 4, 6	Yes	Yes	School-house needs a new floor and door, and a closet; the whole thing in bad shape.
Peru, Clinton Co., District No. 10.	Lengthwise, throwing light on side of desk.	9 to 12, 1 to 4, 6	Yes	Yes	They need a new closet.
Peru, Clinton Co., District No. 6.	Crosswise, throwing light on front of desk.	9 to 12, 1 to 4, 6	Yes	Yes	They are going to build a new closet this week, and then everything in good shape.
Van Buren, Dist. No. 1	Facing south, windows on side and back.	9 to 11.30, 12.30 to 3.30. 5½	Yes	Yes	The reply to suggestions for improving present conditions nothing, as they will put in new seats this week.
Van Buren, Dist. No. 2	Facing south, windows on sides and back.	3 A. M., 3 P. M., 6	No; one hour at noon.	Yes	The reply to suggestions for improving present condition is, I don't know, unless close back windows.
Van Buren, Dist. No. 3	Facing east, windows on sides.	3 A. M., 3 P. M., 6	Yes	Yes	Seats are not adapted to size of scholars; this is one of the largest houses in the town, and with modern seats would be a good specimen, and for the number of scholars there is a good supply of pure air.
Van Buren, Dist. No. 4	Face south; windows sides and back.	3 A. M., 3 P. M., 6	Yes	Yes	Seats are the worst in town; new seats are needed for comfort of children.
Van Buren, Dist. No. 5	Facing east; windows on side.	3 A. M., 3 P. M., 6	Yes	Yes	None given.
Van Buren, Dist. No. 6	Facing north; windows side and back.	3 A. M., 3 P. M., 6	Yes	Yes	There is a recess of one hour at noon and fifteen minutes A. M. and P. M.; seats are bad; should be replaced by new ones and adapted to the grades of children; the privies should be separate on opposite parts of the lot; there should be some system of ventilation.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation	Heating.
Van Buren, No. 7	Wood........	1	6,781	16	423+	No drainage; closets double.	None	Stove.
Van Buren, No. 8	Wood; new.......	1	8,064	12	672	No drainage; closets double.	None	Coal stove.
Van Buren, No. 9	Brick	1	6,650	23	289+	No drainage; closets separate and bad.	None	Stove.
Van Buren, No. 10	Very old wood	1	3,600	7	514+	No drainage; closets double and decent.	None	Coal stove.
Van Buren, No. 11	Wood.............	1	5,520	23	240	No drainage; closets separate, one each side of lot; fence between.	No ventilation, except by doors and windows.	Coal stove.
Van Buren, No. 13	Wood.............	1	3,663	15	244+	No drainage; closets double; built on to ante-room.	None	Coal stove.
Van Buren, No. 14	Brick	2	5,642	21	268+	No drainage; closets separate and filthy.	An effort to ventilate in the ceiling.	Coal stoves
Van Buren, No. 15	Wood.............	1	6,589	28	235+	No drainage; closets double and filthy.	Two registers in wall at back.	Stove.
Brandon, District No. 1..	Wooden	1	4,992	20	249+	Closets in good tidy condition.	By means of windows and ventilator into attic.	By stove.
Brandon, District No. 2..	One story structure	1	7,200	30	240	Privies in excellent condition.	By windows.........	By stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Van Buren, No. 7	Facing west, with row of seats on north and south sides; windows all around.	8 A. M., 3 P. M., 6	Yes	Yes	This is a very pleasant school-room; I would change the seats or close the end windows; the effect of this cross-light must be bad.
Van Buren, No. 8	Facing east; windows on sides.	8 A. M., 3 P. M., 6	Yes	Yes	A fine house, new and well arranged, finely situated for natural drainage; a credit to any district.
Van Buren, No. 9	Facing west; windows on sides.	8 A. M., 3 P. M., 6	Yes	Yes	The reply to suggestion for improving present condition is, ventilate.
Van Buren, No. 10	Facing east; windows on sides.	5 hours, with 1 hour at noon.	Yes	Yes	Nothing to say only to abolish the district.
Van Buren, No. 12	Facing north; windows on side and back.	8 A. M., 3 P. M., 6	Yes	Yes	There is a recess of fifteen minutes, and one hour at noon; the building is in good condition; this house has recently been repaired; it is very tight; there should be some system of ventilation, and the room enlarged; I would close the south windows in this case.
Van Buren, No. 13	Facing east; windows on sides.	8 A. M., 3 P. M., 6	Yes	Yes	Seats are bad; the privies should be removed from the house; the entrance of one is from the ante-room, a few feet from school-room door.
Van Buren, No. 14	Facing east, windows on side of each room.	8 A. M., 3 P. M., 6	Yes	Yes	The suggestion for improving present condition is, put in new seats.
Van Buren, No. 15	Facing west, windows on sides.	8 A. M., 3 P. M., 6	Yes	Yes.	(a.)
Brandon, District No. 1	Lights both in end and side of building, seats facing the end.	6	Yes	Yes	The building is one story wooden, well built.
Brandon, District No. 2	Windows on side and one end, seats facing end.	6	Yes	Yes	None given.

(a.) The suggestion for improving present condition is, new seats; the summary of the observations taken on the school buildings and surroundings in the town of Van Buren is, first, as a rule the capacity of the school-rooms is sufficient, and the redeeming point is the uniform high ceiling, which, for a small school, gives a good quality of air, even if there is no special system of ventilation, yet I would insist on some uniform plan in all buildings; second, a large majority of the houses are heated with coal stoves, difficult to manage in extremes of weather; I would heat all rooms where stoves are necessary with wood, giving a better atmosphere, and better radiation; third, many of the houses should close some of the windows and change the position of the seats to obviate the ill effects of cross-light; fourth, many of the old seats are very objectionable, particularly in Nos. 3, 4, 6, 13, and in No. 14 where there is a miserably constructed seat of a modern plan; fifth, the buildings as a rule are located on good sites, with an abundance of room for all practicable purposes, and generally favorable for natural drainage, although I failed to find any artificial plans in any case; sixth, the great abomination is "water closets;" as a rule they are a disgrace to civilization, particularly Nos. 12, 14, 5, 13, 4, 15, 9; I would wipe out the whole lot and put up buildings in a manner, and locate them in keeping with an appearance of common decency at least; as they are, they are a fruitful source of immorality, vice and disease; seventh, I will say there is a strong tendency manifest to improve in all matters that pertain to our district schools, and what is wanted is a clear comprehension of the wants, in given cases, on the part of those who have this important matter in charge; a strong argument for putting this great interest in the hands of intelligent managers, instead of some ignorant, irresponsible person whose friends are to be benefited.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Brandon, District No. 3..	Wooden	1	7,488	26	288	Closets kept very clean..	By means of windows and ventilators into attic.	By stove.
Brandon, District No. 4..	Good substantial 1 story building.	1	7,488	35	213+	Closets, both for male and female scholars, in good, clean condition.	By means of windows.	By stove.
Brandon, District No. 5..	1 story; well built.	1	6,240	17	367+	Closets good............	By window...... ..	By stove.
Brandon, District No. 6..	1 story; substantial	1	4,160	36	115+	Closets kept in good condition.	By windows.........	By stove.
Northville...............	Old, cold and very poor.	2 in one and 1 in the other (2 schools). 1 1 1	7,600 7,600 3,880	45 35 40	168+ 217+ 97	No drainage; closets as bad as can be.	By windows only...	Small box stoves (wood), unfit for use.
Fort Plain	Brick	8 class, 1 assembly room.	7,443.7+	50	148+	Water closets are vaults outside of building; kept quite free from soil and disinfected.	By an opening into a flue that runs from the cellar to the roof, an upward current of air in it is caused by running the smoke-pipe of furnaces through it to the roof.	By furnaces.
Decatur, Otsego county..	Good..	1 in each school. (7 schools.) 1 1 1 1 1 1 1	5,000 3,875 4,000 5,000 6,000 3,600 6,000	25 24 6 21 25 18 30	200 161+ 666+ 238+ 240 276+ 200	Good..................	By windows.........	By wood
Enfield Centre.....	Frame	1	7,920	33	240	Drainage natural elevation; closets, two 6 ft., vaults 20 ft. from main building.	Only by windows and doors.	By one stove.
Warwick.......	Wood............	7	8,952+	42	218+	On the bank of a creek..	By a main shaft in center.	By furn
Town of Onondaga, District No. 28.	Stone.............	1	4,523	30	150+	No drainage; earth closets.	By raising and lowering windows.	Stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Brandon, District No. 3..	Side and end lights; seats facing end.	6	Yes...	Yes............	The building is one story wooden, well built; the reply to suggestions for improving present condition is, none, without rebuilding.
Brandon, District No. 4..	Seats facing end of building, windows in one end and both sides.	6	Yes............	Yes...........	None given.
Brandon, District No. 5..	Windows at end and sides with seats facing end.	6	Yes..	Yes....	None given.
Brandon, District No. 6..	Windows in one end and both sides, seats facing end.	6	Yes............	Yes....	None given.
Northville..	House fronts south; windows each side; sun strikes seats fore and afternoon.	6	Yes...	Not as a rule during school hours.	The reply to suggestions for improving present condition is, nothing less than a new school-house.
ort Plain......	Seats are arranged so that light falls upon them from the left and from behind; in cloudy days the rooms are imperfectly lighted.	9.15 to 11.45; 1 to 3.30 5	No.............	Yes, one at a time, without asking special permission.	The building is substantially built, three stories high, including mansard. The suggestion offered for improvement is, a better ventilation; the system I think good, but, in the present instance, works imperfectly, which, perhaps, is owing to lack of incapacity or insufficient heat.
atur, Otsego county...	Side of windows.........	9 to 12; 1 to 4 6	Yes......... ..	Yes.......	None given.
field Centre...	Side-light..............	9 to 12; 1 to 4 6	Yes............	Yes..	The building is 1½ frame; being a country school-house, there have been no pretentions made to late improvements in arrangement of interior of school-house or of ventilation; location and surroundings are very healthy.
Warwick........	Light comes on the sides and back of seats.	9 to 12; 1 to 3.30 5½	No......	Yes............	The recesses should be restored.
Town of Onondaga, District No. 28.	Windows at the sides....	3 in forenoon, 3 in afternoon. 6	Yes............	Yes............	More chairs needed; seats and desks rather high; new floor needed; I think, with the scant amount of room, window-boards advisable; closets needs cleaning which I shall order; 30 is given as the nmmber of scholars "during winter months."

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. each class room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Highland Falls..........	Frame.........	5 { 1 1 1 1 1	7,026 6,231 5,248 5,248 10,661	52 54 40 56 55	135† 115† 131† 93† 193†	Natural surface drainage; two large water closets, good distance apart.	By windows on pulleys.	Coal stove in each room.
Phelps.........	Brick............	6 { 2 2 2	15,000 13,000 10,000	50 50 50	300 260 200	Drainage natural; building on a hill; soil, gravel; two out-door vaults, separated from main building.	Only by doors and windows.	By furnaces.
Adams Center...........	Wooden..........	3	9,900	33	300	No drainage; open vaults.	By windows and doors, except 2d story which has door and pulley overhead.	Stoves.
Barke	Wood............	Four; only two are occupied.	6,600	40	165	Tile drain; portable vault.	Ventilators 8x8 in.; one to each room.	Wood stoves.
Islip	It is the best in Suffolk county...	4	10,260	32 2-4	315†	Natural drainage; earth closets.	Ruttan system......	Ruttan system.
Town Stuyvesant	3 brick in first-class repair; also 2 of wood in good repair; the other mentioned in "remarks."	No. 4 has two rooms; the remainder have but one.	1 } 1,568 3 } 8,395 4 } 6,681⅓ 5 } 3,960 6 } 5,660 8 } 8,220	13 45 30 15 12 14	120† 186† 222† 264 471† 587†	All have outside closets, some ways from school-houses, with one exception.	Some through transoms and some through pipes to roof; some not any.	Coal stoves, except No. 1, which has wood stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Highland Falls..	All the school rooms have windows on two sides; department No. 1 on three sides; in all the rooms the seats are facing the windows in end of room; windows have blinds.	9 to 12, 1 to 4.... 6	Yes............	Yes..	The building is lathed and plastered; the number of scholars given for each room is the number for month of November, 1886; the height of ceilings in rooms is, 1st department ten feet four inches; 2d department nine feet, nine inches; 3d department eight feet; 4th department, eight feet; 5th department, nine feet, nine inches; the seats and desks are not very well adapted to the comfort of scholars and in department No. 1 the windows run to the floor, making it bad in very cold weather.
Phelps..................	Building faces south; hall through center; seats face north, light from east, west and south.	9 to 12, 1 to 4.... 6	Yes......	Yes.............	The building is three stories and substantial; it is suggested, that the ventilation be changed from the doors and windows, and the circulation of air be brought about through properly arranged flues.
Adams Center...........	Windows on four sides (front ones shaded) above; on three sides below.	9 to 12, 1 to 4.... 6	Yes..............	Yes, if necessary	The building is two story and substantial; condition satisfactory if privy vaults were cleaned frequently enough, and doors made to close tightly so as to avoid floor draughts; to windows (which from diagarm are shown to face scholars) might advantageously be shaded, except that they are useful for teachers, who face the pupils.
Burke	Windows, back and sides.	9 to 12, 1 to 4, 6	Yes	Yes	(a)
Islip	The pupils face west for the south light and east for the north light.	9 to 11.30, 1 to 3.30, 5	No, in acad. and 2d inter. depts.; yes, in prim. and 1st inter. depts.	Yes	(b)
Town Stuyvesant	All have windows at sides and rear except No. 1.	6	Yes	Yes	(c)

(a) The size of the unoccupied rooms is 7,260 cubic feet; if the entire atmosphere could be changed 6 times an hour (which is impossible under the present system of ventilation) each scholar could have but little more than one-half the space required for healthful respiration or about 165 cubic feet of space; therefore the necessity of better ventilation, and dividing up each class, making four classes of twenty each, using the four rooms; light, insufficient; windows too low and badly arranged, light coming from both sides and rear; seats could and should be arranged with left side to the light; two other windows put in on left side of rooms; dark curtains over end windows; for children under 10, two sessions a day of two hours each, with a recess of 10 min. during each session, would, in my judgment, be preferable to the present six-hour custom; two hours should be allowed at noon; from 9 to 11.30 A. M., and from 1.30 to 4 P. M. should constitute the daily session in the common schools for scholars over ten years.

(b) The school-house was built two years ago after most approved ideas in school architecture; it was my fortune to be placed on building committee, and no pains or expense were spared to make a cheerful, healthful school-house; we do not know of anything to be desired; the light is from above and to the left of scholar; the seats are for single pupils and adapted to size of scholars; the ventilation and heating are mutually dependent, the one upon the other; if the building is warmed it is ventilated, and *vice versa;* the air in each room is changed once in each twenty minutes; we regard the Ruttan system of heating and ventilating as the most perfect system yet devised.

(c) All the school buildings except No. 1 are in as good condition as can be expected in country districts; in No. 1 the ceiling is but seven feet high; the seats are arranged along the sides, so that the light is directly in the pupils eyes; the water closet is three feet from the door; the whole building is in a dilapidated condition, and not fit, from a sanitary point of view, for school purposes.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Chester	No. 1, wood, two stories; No. 2, brick, one story; No. 3, wood, one story.	No. 1, 4 rooms; No. 2, 1 room; No. 3, 1 room;	9,126 7,620 9,847	40 36 35	228† 211† 281†	No. 1 on gravel hill; No. 2 clay soil, high ground; No. 3, gravel, slate substrata; closets detached, 40 to 50 feet distant.	By a single register, opening in the chimneys, for each room; No. 2 register in ceiling, 2.3 inches in diameter, opening into attic.	Stoves.
Gravesend	1. Frame ... .. 2. Frame, cellar.. 3. Frame .... 4. Frame .... 5. Frame .... 6. Frame, cellar..	2 2 2 2 1 2	4,792½ 15,066 7,762½ 8,782½ 6,480 12,740	32½ 35 32½ 35 45 90	147† 430† 238† 250† 144 141†	All stand elevated so that there is no standing water; the closets are large and ventilated.	All are ventilated by lower'g upper sashes of windows, except in No. 1.	All are heated by stoves except in Nos. 2 and 6; these by furnaces.
New Hartford, Oneida Co.	Brick, condition good.	3 { 1 1 1	14,520 13,310 6,358	40 70 79	363 190† 80†	House stands on rising ground; drainage good; closets well drained; in good order.	By registers at the base.	By 3 furnaces.
Jamaica	Frame	13 in No. 1, and 1 in No. 2.	10,400	45	231†	Drainage, cesspool and surface; closets are outdoor privies with frame buildings; stone vaults.	By windows and transoms over doors.	Stoves.
White Plains............	Brick	10	8,921 41-60	45	198†	Closets constructed with cemented vaults.	By flues in chimneys connec'd with rooms by ventilators near floor and ceiling, also by cold air boxes in connec'n with furn's	Latest addition by hot air furnaces, and old part by steam.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Highland Falls	All the school rooms have windows on two sides; department No. 1 on three sides; in all the rooms the seats are facing the windows in end of room; windows have blinds.	9 to 12, 1 to 4 6	Yes	Yes	The building is lathed and plastered; the number of scholars given for each room is the number for month of November, 1886; the height of ceilings in rooms is, 1st department ten feet four inches; 2d department nine feet, nine inches; 3d department eight feet; 4th department, eight feet; 5th department, nine feet, nine inches; the seats and desks are not very well adapted to the comfort of scholars and in department No. 1 the windows run to the floor, making it bad in very cold weather.
Phelps	Building faces south; hall through center; seats face north, light from east, west and south.	9 to 12, 1 to 4 6	Yes	Yes	The building is three stories and substantial; it is suggested, that the ventilation be changed from the doors and windows, and the circulation of air be brought about through properly arranged flues.
Adams Center	Windows on four sides (front ones shaded) above; on three sides below.	9 to 12, 1 to 4 6	Yes	Yes, if necessary	The building is two story and substantial; condition satisfactory if privy vaults were cleaned frequently enough, and doors made to close tightly so as to avoid floor draughts; to windows (which from diagarm are shown to face scholars) might advantageously be shaded, except that they are useful for teachers, who face the pupils.
Burke	Windows, back and sides.	9 to 12, 1 to 4, 6	Yes	Yes	(a)
Islip	The pupils face west for the south light and east for the north light.	9 to 11.30, 1 to 3.30, 5	No, in acad. and 2d inter. depts.; yes, in prim. and 1st inter. depts.	Yes	(b)
Town Stuyvesant	All have windows at sides and rear except No. 1.	6	Yes	Yes	(c)

(*a*) The size of the unoccupied rooms is 7,260 cubic feet; if the entire atmosphere could be changed 6 times an hour (which is impossible under the present system of ventilation) each scholar could have but little more than one-half the space required for healthful respiration or about 165 cubic feet of space; therefore the necessity of better ventilation, and dividing up each class, making four classes of twenty each, using the four rooms; light, insufficient; windows too low and badly arranged, light coming from both sides and rear; seats could and should be arranged with left side to the light; two other windows put in on left side of rooms; dark curtains over end windows; for children under 10, two sessions a day of two hours each, with a recess of 10 min. during each session, would, in my judgment, be preferable to the present six-hour custom; two hours should be allowed at noon; from 9 to 11.30 A. M., and from 1.30 to 4 P. M. should constitute the daily session in the common schools for scholars over ten years.

(*b*) The school-house was built two years ago after most approved ideas in school architecture; it was my fortune to be placed on building committee, and no pains or expense were spared to make a cheerful, healthful school-house; we do not know of anything to be desired; the light is from above and to the left of scholar; the seats are for single pupils and adapted to size of scholars; the ventilation and heating are mutually dependent, the one upon the other; if the building is warmed it is ventilated, and *vice versa;* the air in each room is changed once in each twenty minutes; we regard the Ruttan system of heating and ventilating as the most perfect system yet devised.

(*c*) All the school buildings except No. 1 are in as good condition as can be expected in country districts; in No. 1 the ceiling is but seven feet high; the seats are arranged along the sides, so that the light is directly in the pupils eyes; the water closet is three feet from the door; the whole building is in a dilapidated condition, and not fit, from a sanitary point of view, for school purposes.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Alden	New	3 {1	2,898	20	144†	Good condition	Mostly by the windows.	By stoves.
		1	11,700	62	188†			
		1	15,150	52	291†			
Ogdensburg	6 brick, 2 stone, 1 wood. 1	4	12,993¼	63¾	207†	Earth closets mostly, two with vaults.	Mostly by lowering the windows, some by flues, beside chimneys.	By wood stoves
	1	5	11,650†	47†	244†			
	1	4	13,359†	33†	398†			
	1	4	12,017	57	210†			
	1	1	13,010	33	394†			
	1	2	6,849	44	155†			
	1	4	18.447	32¾	563†			
	1	3	16,171	37⅓	433†			
	1	3	10,161†	40	254†			
Whitehall	2 are good; 2 are poor.	10 in one, 2 in two, 1 used in one. 4	12,000	60	200	Drainage poor; closets fair.	Main building and 1 ward by flues; others none but windows and door.	Furnaces and stoves.
		2	10,000	50	200			
		5	5,000	70	71†			
Hobart	Wood	1 in school-house; district hires another room.	24,000	40	600	Good drainage; closets separate (2).	Closets ventilated by "side-openings;" school-house, by windows, etc.	Stoves (wood).
Oneida, District No. 26	All in good condition.	5	12,500	70	178†	Sewers	Openings into flues by the side of the chimneys, high up in the walls.	By stoves.
			4,000	40	100			
			9,000	60	150			
			9,000	60	150			
			9,000	70	128†			
Oneida, District No. 25	All in good condition.	5	7,510.1	109	68.9	....	....	By stoves.
			5,901	53	111†			
			11,432	65	175†			
			22,181.8	127	174†			
			22,181.8	124	178†			
Oneida High School	All in good condition.	6	Not given.	Not given.	....	....	....	By furnace.
Ausable Forks	No. 1, frame, not old; Nos. 2 and 3, frame, old.	One has 5, one has 2, one has 1.	8,091†	34†	237†	Drainage natural & good; closets common unimproved.	No. 1, by windows & transoms over door; chimney flues; Nos. 2 & 3, windows at top & bottom, & doors.	By stoves burning wood.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Chester	No. 1, light enters from one side and behind; No. 2, from each side; No. 3, from sides and back.	No. 1, 5 hours; primary 3 hours; Nos. 2 and 3, 5 hours.	Yes	Yes	House No. 1 has, in addition to class-rooms, a recitation room 4,140 feet; cubic feet is meant in all cases; water closets consist of open vaults, emptied each spring; coal ashes or lime added every week or two during summer; the registers for ventilation open in chimney near floor; pipes from stoves near ceiling.
Gravesend	(*a.*)	9 to 12, 1 to 3, 5	Allowed in all except No. 4, smaller scho's leave when lessons are over.	Yes in all schools when they desire.	(*b.*)
New Hartford, Oneida Co.	The windows are at each end of room at the right and left of seats.	9 to 11.45, 1 to 3.30 5¼	No	Yes	Think we are deficient in ventilation; No. 3 too small; room No. 1 is twelve feet to ceiling, room an oblong square; room No. 2 is eleven feet to ceiling, room an oblong square; room No. 3 is ten feet to ceiling; room an oblong square; Nos. 1 and 3 are on ground floor; No. 2 is over No. 1; windows in No. 1 at one end of room are nine feet six inches by three feet four inches; the other end are six feet six inches by three feet three inches; No. 2 are six feet six inches by three feet three inches, two at each end; No. 3 are five feet nine inches by two feet six inches; six windows arranged as above in relation to seats.
[illegible]ica	In larger rooms light from both sides; in smaller from back & right or left	9 A.M. to 3.30 P.M. 6½	Yes	Yes	Board of education attentive to school interests.
[illegible] Plains	Plenty of light from rear and both sides of seats.	9 to 12, 1.30 to 3.30 5	Yes	Yes	The building has a large addition of four rooms, new; earlier addition, four rooms built 10 years ago; it is suggested to have heat from furnaces introduced from or near the floor; it is brought into the new rooms at a height of ten feet from the floor.

(*a.*) No. 1 In the larger room the windows are in front of, behind and on the right of the seats; in the smaller room they are behind and on each side. No. 2. The windows are behind and on either side of the seats in the larger room; in the smaller room they are in front of and on either side. No. 3. In the larger room the windows are on each side of the seats; in the smaller room in front of and on the left of the seats. No. 4. In the larger room the windows are before and behind the seats; in the smaller room on either side. No. 5. The windows are on either side of the seats. No. 6. The windows are on each side of the seats in both rooms.

(*b*) It is suggested that in No. 1 the window sashes be altered so that the upper sashes can be lowered; the trustees of No. 1 contemplate erecting a new building; No. 6 is overcrowded to a great degree; in no school do I find any attention paid to the arrangement of seats in reference to windows or light; the ventilation in all schools is good, except in No. 1; all the buildings stand on brick foundations which are so arranged as to allow ventilation under the buildings; I found all the buildings in a good and clean condition, and that all the teachers appreciate the necessity of ventilation; the water closets used by the male scholars as a rule are not as clean as they should be, and in a few instances I have recommended that the seats be arranged so that the evil I refer to may be remedied; the trustees appreciate the necessity of cleanliness, and I must say that they use all their efforts to enforce cleanliness.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Esperance, Schoharie county.	Buildings all comfortable; Nos. 2 and 5 new.	There are 7 schools, only 1 of which has 2 class-rooms. 1 2 3 5 6 7 8	12,844 3,610 3,510 13,440 5,400 5,382 3,610	45 15 20 50 35 25 25	285† 240† 175† 268† 154† 215† 144†	Drainage and closets poor.	No ventilation in any, except No. 5.	No. 5 furnace in cellar; the others, coal or wood stoves in room.
Parish............	Frame	3 1 1 1	7,500 7,500 15,000	53 44 68	141† 172† 220‡	No drainage; the excrement falls on the ground in closets, and is very offensive.	The 7,500 cub. feet rooms are ventilated by windows only, the other by a scuttle-hole in garret and fresh-air flue back of stoves.	Three wood stoves.
New Rochelle, ...	Two story and basement brick.	14, only 13 are used.	8,149 8-13	44 11-13	181†	(*a*)	(*b*.)	By steam; two or more direct radiators in each room, around which external air is admitted as described under ventilation.
New Rochelle, 2 and 3....	No. 2, 1 story frame, No. 3, 2 story frame,	No. 2, 1; No. 3, 2; one room in No. 3 unused.	4,356 4,032	33 59	132 68†	Schools 2 and 3 have no drainage; closets in separate buildings.	School No. 2, windows; school No. 3, windows and flues.	Schools Nos. 2 and 3, stoves.
Highland.	Frame	3	10,833⅓	51	212†	No drainage; closets outside, frame building and properly cared for.	By board under window, air coming between sash.	By coal stoves.

(*a*) No drainage except surface drainage; there is one closet in the building for use of teachers only, of the ordinary pattern, flushes with water from tank in the attic and draining into a ventilated cesspool, which is situated at some distance and cleaned at irregular intervals; the closets for the pupils are in two sheds situated fifty yards from the school buildings; the receptacles are pans containing ashes, these are emptied weekly.

(*b*) Four flues 20x25 inches made of tin and extending from the first floor vertically upward to a distance of ten or more feet above the roof, and fitted with gas burners for heating; with these flues many of the rooms communicate directly by openings 12x18 inches near the ceiling; the remaining rooms communicate with main flues by smaller ones 12x18 inches running horizontally and joining the main flues at right angles; fresh air is admitted in the class-room by openings (usually two in each room), under window sills 8x20 inches; admitted air passes at once around steam radiator fitted with hood and jacket, thence by an opening near the floor into the room.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Alden	Lighted on sides	3 in A. M., 2.30 in P. M., 5½	No.	At any time	None given.
Ogdensburg	The light comes from one side, in some from both sides.	6 4 to 3d grade primary.	Yes.	Yes.	The reply to suggestions for improving present condition is, many in regard to lighting, heating, ventilation and some of the closets. Besides these nine schools we have a fine brick academy, with some 150 pupils, and the Catholics have two large parochial schools, one brick and one wood, and are building another.
Whitehall	Light is poor in most	5	No.	Yes.	They need improving in every particular.
Hobart	"Side-light"; seats face south, light pretty strong in front.	6 Sometimes ¼ longer for large pupils.	Yes.	Yes.	The building is good, as a building; poor, as school-building. I have no suggestions to make, as the inhabitants of the district are making efforts to build a Union school-house or graded.
Oneida, District No. 26	Light comes from back or side or sides.	5½ to 5¾	Yes.	On pressing occasions.	None given.
Oneida, District No. 25	......	......	Yes.		
Oneida High School	......	......	Yes.		
Ausable Forks	No. 1, windows front and rear; No. 2, rear and both sides; No. 3, both sides.	9 to 12; 1.30 to 4. 5½	Yes.	Yes.	The reply to suggestions for improving present condition is, hot-air furnace in main building. There are recesses of 10 to 15 minutes A. M. and P. M.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Gainesville.	Two story wood building.	2	11,298	28½	396†	No system of sewerage; gravelly soil; closets for each sex; character good.	By lowering windows from top.	By stoves; wood burners.
Leonardsville, Plainfield.	Good	3 { 1 1 1	25,000 17,000 8,000	40 40 40	625 425 200	Drainage, none required; closets in good order.	By air draughts in wall.	By furnace.
Groton, District No. 8	Brick	5	10,221 3-5	37½	272†	Located on a hill; natural drainage; separate closets; that for girls of brick; for boys of wood.	In connection with the steam heater by flues, and cold air admitted from the outside.	By steam.
Lansingburg	1 good; 1 bad; 2 indifferent.	4 in one; 8 in one; 8 in one; 6 in one.	8,632	46†	187†	One has good drainage, 3 poor; 1 has water closet with good drain; 3 water closet, poor.	One has good ventilation by central flue; 3 by windows, poor.	1 by stoves; 2 by hot-air furnace and stoves; 1 by hot-air furnace.
Fort Edward	No. 1, brick in good repair; No. 2, brick built quite recently.	No. 1, has 9 rooms; No. 2, has 4 rooms.	5—12,915 4— 2,457 4— 6,534	60 18 37½	215† 136† 174†	No. 1 drainage good, closets overrunning water; No. 2 drainage good, closets with vaults not good.	By windows only	By coal stoves.
Allentown	Not given	No. 1 has 2 rooms; No. 2 has 1 room.	2— 9,450 1—12,000	50 55	189 218†	Good drainage; closets good size.	By windows and doors; by letting the windows down.	By stoves heated by burning natural gas.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Esperance, Schoharie county.	Lighting generally fair..	9 to 12, 1 to 4, 6	Allowed....	Yes.	The reply to suggestions for improving present conditions is, stove ventilation by means of "jackets" and fresh-air pipes under. No 5 is a fine new building, containing two class-rooms of 13,440 cubic feet each, heated by furnace in cellar and pretty well ventilated but the closet, which is within about 20 feet, has a vault dug in solid rock and no drainage whatever; Nos. 3, 6 and 8 average less than 200 cubic feet to the scholar, and their only means of ventilation is to open the windows and allow a blast of cold air to strike directly upon some of the seats.
Parish..................	Light back of seats and to the side.	6	Yes...	Yes............	There should be ventilating flues in the two smaller rooms, and the privies should be cleaned out twice or three times a year; lime and dry earth ought to be provided to absorb the liquids and prevent the stench; the surplus water from the pump is allowed, by imperfect drainage, to percolate back into the well.
New Rochelle, 1...	Corner rooms have windows on two adjoining sides; other rooms on one side; in the former the windows are at the rear and on the left side of seats; in the latter, on the left side.	9 to 12, 1 to 3, 5	Yes............	Yes..	(*a*.)
New Rochelle, 2 and 3...	No. 2, 3 windows on each side and one at end; seats face end windows; No. 3, 3 windows on each side.	9 to 12, 1 to to 3, 5 Both schools.	Yes; 20 minutes, A. M., both schools.	Yes.......... ..	Schools 2 and 3 are primary schools; No. 1 is a graded school.
Highland	Face side and back.	9 to 12, 1 to 4, 6	Yes; in primary and intermeditae	Yes	Recesses are allowed in primary and intermediate; as regards drainage, I can only say school-house is on a hill, descending every way, therefore really requires no drainage.

(*a*) There is a recess of twenty minutes in the A. M. session; I consider the closet accommodations for the pupils both insufficient and unsanitary; the former fault is easily remedied by increasing the number of closets; as soon as the water supply, now being introduced into the village, is perfected. the present system of closets should be abolished and a more sanitary one substituted; the building is surrounded by ample grounds and situated on a gentle eminence sloping towards Long Island sound; the basement contains heating apparatus, and the rear portion which is entirely abovo ground is used as a play-room for the pupils in bad weather.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Milton, Ulster Co.	Frame	2	6,365	27½	231†	Two closets for separate use of male and female scholars, situated 100 feet from house.	By windows	By coal stoves.
Westport, Essex Co.	Wood	3 { 1 1 1	7,652 5,168 2,648	40 40 23	191† 129† 115†	Soil and surface drainage, good; privies close to school building; no water supply.	No ventilation except by doors and windows.	By furnace in basement.
Clarence Center	Brick	2 { 1 1	17,388 18,144	27 32	644 567	Drainage good; closets two in number in good condition; separate for boys and girls.	No ventilation excepting windows.	By furnace, coal.
Morristown	Frame	3 { 1 1 1	22,464 13,248 13,248	22 34 44	1,021† 389‡ 301†	Drainage none; closets, stone vaults wooden uprights.	Wooden pipes to top.	Wood stoves.
Camden, Oneida county	Brick	4 { No. 1, 1 No. 2, 1 No. 3, 1 No. 4, 1	4,438 10,800 10,800 16,200	70 65 65 135	63† 166† 166† 120	No drainage; closets detached.	From windows and into chimney.	Furnace.
Wolcott, Wayne county.	Brick, with stone basement.	Report says 8; dimensions and number of scholars of only 7 given.	7,200 7,000 8,000 8,000 13,600 13,600 13,600	45 30 45 47 37 20 30	160 233† 177† 170† 367† 680 453†	No drainage; wooden closets, stool is upon top ground, cleaned 4 times a year; use road dust in summer and lime in winter to disinfect.	No ventilation except in the three upper grades; in these there is a trap in ceiling above.	By both wood and coal stoves.
Afton, Chenango county	New wood building; all in good condition.	6 { 1 2 3 4 5 6	8,910 7,180 3,910 7,180 8,910 6,160	40 20 20 35 35 40	222† 356† 195† 208† 254† 154	Drainage is good; closets in good condition.	By flues coming in from outside and opening under stoves, with jackets around stoves, also flues in each room to carry off bad air.	By wood and coal stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Gainesville........... ..	Light good; lighted from side windows.	9 to 12, 1 to 4, 6	Yes.............	Yes.............	There is a recess of fifteen minutes in forenoon and fifteen minutes in afternoon; the suggestion offered to improve present condition is, use of window boards to improve ventilation; the rooms are well lighted; the seats are arranged (so far as possible) that the light comes into left hand of pupils; part from right side of pupil; the total area of windows is 227.5 square feet in higher department, and 136.5 square feet in primary.
Leonardsville, Plainfi..d..	Light from both sides ...		Yes; of short duration.	Yes...	There are thirteen school-houses in town, two joint; there are three rooms in one school; one in rest; the principal school at Leonardsville — one with three rooms — is the one reported; the average number of scholars in each class-room is given, "forty at most."
Groton, District 8........	Seats facing the south have windows on the east, those facing the north have windows on the west.	9 to 12, 1.15 to 4, 5¾ hrs; in primary departme't young pupils dismissed at 10.30 A. M., 2.30 P. M.	Yes.........	Yes, one at a time,	There is one recess, of ten minutes each, forenoons and afternoons (40 is given as the average number of scholars in each class-room during the winter term, and 35 during the fall and spring term, for the attendance I averaged 40 and 35, which gives 37½).
Lansingburg	A few light fom each side, the majority from rear and one side, some from one side only.	2.30 hours in forenoon, 2.15 in afternoon. 4¾	No	Yes.............	(*a*)
Fort Edward............	Windows on one side of rooms only to right or left of seats as case may be.	9 to 12, 1 to 4.... 6	Yes..	Yes........	There is a recess of 15 minutes in A. M. and one in P. M., need new buildings with better system of ventilation and heating.
Allentown...............	Windows, back and at the sides of seats in school No. 1.	6 hours a day; primary department less.	Yes.............	Yes, if permission is asked to leave the room.	Ventilation is very bad; when the rooms are thought to be too warm the windows are raised so that a draught sweeps upon pupils heads and necks with the usual result of colds and catarrh.

(*a*) The average sitting in each room 49†; average number of scholars 46†; the reply to suggestions for improving present condition is, new buildings, improved ethod of heating and entire revolution in ventilation; the average number of cubic feet per sitting for all schools is 178; average number of cubic feet for each holar taking the average attendance is 187; a shocking average with poor ventilation, the children are affected badly in consequence; we have a good school board te willing to do anything the people will give them funds to do with, but a pure atmosphere in most of the rooms can only be obtained, I think, by building anew h good ventilation as the prime object.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita	Closets and drainage.	Ventilation.	Heating.
German, Chenango county	1-story frame buildings, there are 8 in district.	1	3,129.3†	15	208.6†	Drainage natural only; closets detestable.	By windows and doors only.	1 wood stove.
Mineville, Essex Co......	Frame buildings; there are two in district.	Three in one; one in the other.	9,856	35	281†	Good drainage	Well	Coal stoves.
			6,930	40	173†			
			6,930	68	101†			
			6,930	41	169†			
Westfield, Herkimer Co..	Frame	6	9,300	90	103†	No drainage; closets outside and separate.	Flue ventilation.....	Furnaces.
			4,800	40	120			
			3,000	25	120			
			3,600	30	120			
			9,600	48	200			
			5,760	39	147†			
Whitney's Point, District No. 10.	Not given.	5	4,800	43	111†	No drainage; the closet separate from the school building.	Almost entirely from windows; in academic department a ventilator in ceiling overhead.	By stoves.
			7,800	35	222†			
			7,800	37	210†			
			4 800	30	160			
			25,000	63	396†			
Flatlands	Wood............	4 { 1&4	17,296	50	345†	Drainage good; privy about fifty feet from building.	By extraction through openings in floor into heated cellar.	By two hot-air furnaces in cellar.
		2	7,332	36	203†			
		3	9,024	54	167†			
Canarsie, Town of Flatlands.	Wood............	4 { 1	8,151	34	239†	Drainage good; privy with vault, about fifty feet from school building.	Two rooms by small opening into chimney 6x8 inches, near ceiling, with grating over it; two rooms by flue; both rooms upper and lower by same flue.	By hot air furnaces in basement.
		2	9,823	37	265†			
		3	8,151	62	131†			
		4	8,723	92	94†			
Randolph	Brick	4 in main building. (See remarks concerning branch.)	Range from 6,400 to 36,000.	Range from 50 to 75.	Ranges from 128 to 480.	No drainage whatever; closets are old-fashioned, and simply villainous.	Well ventilated by windows and register communicating with chimneys; also use mode illustrated in Fig. 7.	By wood and coal stoves.
Ovid, Seneca county . ..	Brick	5 (Dimensions of only 4 given.)	15,120	50	303†	No drainage; closets poor and badly cared for.	By windows & doors only.	Coal stoves.
			7,055.64	35	201†			
			10,281.6	50	205†			
			9,000 45	45	200†			

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued.*)

PLACE.	Arrangement of seats.	School hours.	Recess.	Are children allowed to go to closet in school hours.	Remarks, etc.
Milton, Ulster county.....	The light falls upon the pupils' book from both sides.	9 to 12; 1 to 4,	No.......	Yes.......	No recesses allowed; but an intermission of sufficient length is granted to fully compensate for it; the building is situated on a sandy eminence overlooking the Hudson river and has apparently healthy surroundings; building has 11½ ft. ceiling; windows are 3½ ft. from floor and 7 ft. high; there is 1 Alaska and 1 Globe stove jacketed.
Westport, Essex county..	In grammar and intermediate, 2 windows on each side and 3 back; primary, 2 windows on one side and light poor.	9 to 12; 1 to 4, 6	Yes............	Yes..	There is a recess of fifteen minutes in morning and same in afternoon; the building is two stories and basement; built for dwelling; first floor 8 feet high; second, 8½ feet; this building is wholly unsuited for its present use, and all that can be done is to devise some means of ventilating aside from windows as these are so close to the seats that they cannot be utilized to any extent during the winter months; the privies should be removed farther from the building.
Clarence Center..........	Seats lighted from two sides and from behind.	8 A. M. & 3 P. M., 6	Yes.............	Yes............	The ventilation should be by flues in chimney, of which there are four in number and only one used for the smoke from furnace; the building standing north and south the east and west windows should be provided with blinds, to protect from direct rays of sun; the building was erected in 1879.
Morristown.	Backs to windows.......	6 hours each day; 5 days.	Yes	Yes..	They have recess twice each day. The building is 50 feet by 50 feet; I consider ventilation bad; the pipes are of no use; there is no draught to them; the only ventilation there is is by doors and windows; the location is high and dry; rock for a foundation.
Camden, Oneida county..	Back and side to light; light in Nos. 3 and 4 insufficient.	6	Allowed in Nos. 1, 2 and 3; not No. 4.	Yes....	No. 1 is a damp basement and should be abandoned; I noticed quite a number of near-sighted children; all of the rooms are insufficiently lighted; the school-house at West Camden should be looked after.
Wolcott, Wayne county..	Face away from windows	5	No, except first primary.	Yes......	There is a closed passage or hall covered, and with very little or no ventilation, leading from closets and attached to main school-building; in certain directions of the wind the stench is unbearable; I think the closets should be separate from school building.
Afton, Chenango county.	Light is admitted from the sides of room in all cases except in grammar department.	8.45 to 11.45 A. M., 1 to 3.30 P. M. 5½; primary, 2 hours less.	No............	Yes; very rarely refused.	Every effort is being made by the board to place the school building in as good a sanitary condition as possible. Room 1 is study-room; rooms 2 and 3 are recitation-rooms; 4, grammar department; 5, intermediate department; 6, primary department.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Wappinger's Falls, Dist. No. 1.	Large bri'k buildi'g	3	10,700	41	260+	Well drained; two privies brick buildings over vaults, thirty feet from school building.	By ventilating flues at the end of each room.	Hot air from a heater in the basement.
Wappinger's Falls	Brick	8	8,996½	45	199+	Location, dry; drainage, good; closets some distance from the building, with deep vaults.	By ventilators in the sides and ceilings of the rooms; fresh air admitted over and back of the steam pipes by an arrangement for that purpose at the window sills.	Heated by means of steam pipes in the rooms.
Greenwich	One building brick two stories, the other wood, 1 story	Eight in one; one in the other.	11,463⅛	51	224+	Ordinary out-door closets about forty feet from school building.	By windows and doors.	Steam in one; stove in the smaller.
Canisteo	Two-story wood...	6 { 1&2	11,760	40	204	No drainage; closets are benches with pit, water in bottom.	Nos. 1, 2, 3, 4, by small ventilator 8x12 in wall, and otherwise only by the windows and doors.	By coal stoves.
		3&4	11,760	45	261+			
		5	10,500	50	210			
		6	10,500	60	175			
Coeymans Hollow	Brick	1	9,000	46	195+	Good.......	By a ventilator at the end near the floor and by space at the top of the windows.	By coal stove.
North Coeymans, District No. 2.	Frame	1	4,224	25	168+	Building stands on rock, dry at all times; water closet in two apartments each double-barrelled.	By windows and doors.	One coal stove.
Coeymans, District No. 3.	Good	1	8,800	40	220	Good	Well	By coal.
Coeymans, District No. 4.	Wood............	1	7,260	20	362	Stone drains; closets located about 75 feet from school-room.	By the windows.....	By coal stove.
Coeymans, District No. 5.	Wooden..........	1	5,200	15	346+	Good	By opening door or raising window.	Wood stove.
Rock School, Coeymans, No. 11.	Frame	1	4,820	12	360	Good..	Lower windows from top.	Wood stove.
Alcove, Coeymans, No. 13	Stone	1	8,400+	15	[illegible]+	No drainage; very good closet (only one).	It has no ventilation.	Wood stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
German, Chenango county	At German, light to back of scholars, and at the others side light.	9 A. M. to 4 P. M., 7	Yes	Yes	I would advise that in country towns the health officer should be required to inspect all closets and enforce a better sanitary condition than now exists.
Mineville, Essex Co	Good	6	Yes	Yes	The closets require better drainage.
West Winfield, Herkimer Co.	Light from back and side.	6	Yes	Yes	The suggestion offered for improving present conditions is, larger class-rooms; we are having an excellent school and it is growing very fast.
Whitney's Point, District No. 10.	Lighted from back and side.	8.45 to 12.00, 1.15 to 3.45. 5¾	Yes	Yes	There is a recess in forenoon of fifteen minutes, and one in afternoon to lower departments of ten minutes; the building is a very good one indeed for academic department, and two departments below but not large enough for four departments below as now used; a more uniform temperature for different parts of room might be secured if the building was heated by a furnace; more room needed for lower department.
Flatlands	Seats face windows in every room.	9 to 12, 1 to 3. 5	There is a recess in the morning; none in the afternoon.	Yes	Plan of building is so bad, I can see no way to improve present condition; the building is one story, with cellar; four rooms on one floor separated by three glass partitions; rooms No. 1 and No. 4 are opened into one room, with one teacher;
Canarsie, Town of Flatlands.	In three rooms the light comes from both sides, the seats facing blank wall; in the advanced room the light comes from one side and one end of room, the seats facing two (2) windows.	9 to 11.45, 1 to 3, 4¾	No	Yes	The building is two stories and basement; two rooms on each floor; seats in the advanced room should face the blank wall instead of windows; more ventilation is suggested as an improvement to present condition.
Randolph	Lighted well from back and sides.	9 to 12, 1.15 to 3.45, 5½	No	Yes	(a)
Ovid, Seneca county	Side light	6	Yes	Yes	(b)

(a) There is, in addition to the main building, a branch containing two class-rooms of 10,000 cubic feet each, approximately; there is no school in branch (or at least was not when this report was sent in, in October): both buildings are in good condition; the closets are in bad condition as follows: They are of wood, built with shallow vaults, and are very offensive to the nose, whereas they should be built either with troughs that can be easily emptied once in each week, or fixed so they can be cleaned with running water from the mains as they are used; the latter would necessitate drains.

(b) The boys' privy should be raised and moved to the rear, and coal ashes should be deposited in the vaults daily and the interior kept clean; the girls' privy is not properly screened, nor is it large enough; small pupils cannot pump the water they need to drink, nor can they, without a too long extension of recess, obtain as much water as they need on warm days; there should be water tanks in the school-rooms themselves, attended to by janitor; the number of scholars in the fifth room, the first primary, is given at sixty-five, but the report fails to show the dimensions of that room; hence the average air space *per capita* could not be calculated.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Aquetuck, Coeymans, No. 16.	Frame	1	7,000	15	466†	No drainage; closets with vaults under.	Only by windows and doors.	By wood, one stove.
Indian Fields, Coeymans, No. 17.	Frame	1	6,720	14	480	Drainage into Hannecroix creek; character of closets, all right.	By lowering windows	By wood.
Deposit..	Wooden..........	The report says 8, but that includes three recitation-rooms and the chapel, which is also used for recitation; there are only 4 regular class-rooms.	10,920 13,650 13,650 14,560	78 48 96 104	140 284‡ 142† 140	Closets several rods in rear of building.	By windows and doors only.	By steam.
Town of Elmira, District No. 1.	Wood....	1	7,200	9	800	Drainage — surface; outside closets.	By doors & windows.	Stove.
Town of Elmira, District No. 2.	Wood......	1	3,536	8	442	Drainage — surface; outside closets.	By doors & windows.	Stove.
Town of Elmira, District No. 3.	Wood......... ...	1	5,400	14	385†	No drainage, except surface; outside closets.	By doors & windows.	Stove.
Town of Elmira	Wood.....	2	6,237 6,237	19 25	328† 249†	Drainage — outside cesspool.	By doors and windows only.	Stoves.
Town of Elmira, District No. 5.	Wood.....	1	7,500	20	375	Drainage — surface; outside closets.	By doors & windows.	Stoves.
River Road, Town of Elmira, District No. 6.	Wood	1	8,748	21	416†	Drainage — out of door cess-pool.	By doors & windows.	Stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Wappinger's Falls, Dist. No. 1.	Light received from side and rear; plenty of it;	6	Yes	Yes	Heating in winter has been defective; privy vaults condemned on principle.
Wappinger's Falls	Light admitted from one side, and in part of the rooms from the back also.	In the lowest grades 3 hours; in the other grades 6 hours.	Yes	Yes	(*a*)
Greenwich	Light over shoulder.	5¼ hours per day	No	Yes	The reply to suggestions for improving present condition is less scholars in some of the rooms.
Canisteo	Light comes in at the sides in all the rooms.	Nos. 1 and 2, 5¼ hours; No. 3, 4¾ hours; No. 4, 4½ hours; No. 5, 4¼ hours; No. 6, 4 hours.	Yes	Yes	The ventilation in the lower rooms is not good, and there is only one small recitation room 12x15x14 and contains only one window and at times there are thirty scholars therein (the number of cubic feet in this room is 2,520, which will allow only eighty-four cubic feet of air per scholar when there are thirty scholars in the room).
Coeymans Hollow	Window at right and left	6	Yes	Yes	The character of the building is good; the reply to suggestions for improving present condition is, that shade tree be set out on the grounds.
North Coeymans, District No. 2.	Light from rear and side of seats.	6	Yes	Yes	The building is in good condition; the reply to suggestions for improving present condition is, a coat of paint and one more load of coal; there are two recesses per day.
Coeymans, District No. 3.	Windows at sides	9 A. M. to 4 P. M., 7	Yes	Yes	None given.
Coeymans, District No 4.	"Oppositely with windows."	6	Yes	Yes	They have recess twice a day.
Coeymans, District No. 5.	Seats arranged at right angles to the windows.	9 to 12, 1 to 4, 6	Yes	Yes	The reply to suggestions for improving present condition is, new siding and to be painted.
Rock School, Coeymans, No. 11.	Seats opposite windows	6	Yes	Yes	The suggestion for improving present condition is, ventilators in two windows and doors to closets.
Alcove, Coeymans, No. 13	Is very good	9 A. M. to 4 P. M., 7	Yes	Yes	None given.

(*a*) Privy vaults condemned on principle; ventilation and light ought to be increased, but the conditions are fair; the building is well lighted and airy; accurate minute suggestions not attempted; although this wealthy and important village of 6,000 inhabitants, and containing manufacturing plant of several millions of dollars value, shows a relatively healthy record, yet there is much sickness constantly present, and the wonder is, that with the universal privy vault, absence of proper drainage, with sewerage imperfect and of insignificant extent, the death record is not formidable. However, at times the rate rises, and at present writing (October 16, 1896) croup is rife of the worst membranous variety, and already four deaths have occurred from his cause and new cases are cropping out here and there.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation	Heating.
Carr's Corners, Town of Elmira, No. 7.	Wood, one story...	Report says two; but only the large one is a regular class-room, the small room, although termed a class-room in the report, is only a recitation room.	22,400	42	533†	Outside cesspools in ground, no drainage.	Small ventilators at top and bottom.	Stoves.
Ellenville, Ulster Co......	One brick; 3 frame (there are 4 school-houses in district.)	One school has 6; 2 schools have 4 each; 1 school has 1.	Range from 1,611 to 11,186.	Range from 20 to 50.	Range from 80† to 222†.	No drainage; privy vaults 100 feet away.	By doors and windows, principally.	One by steam, two by furnace, one by stove.
Albion Village, District No. 1, High School Building.	Brick	(a)	10,871† 18,456† 24,795 13,956½	40 85 130 56	271† 217† 190† 249†	Drainage good; closets good; draw-closet in use.	Two hot air registers, each about 2 feet square; 1 ventilator 1 ft. square; the above mentioned are inlets; outlets are small and insufficient, communicating with the garret.	By steam pipes in good repair.
Albion Village, District No. 1, Central Ward School No. 1.	Brick	3	13,563† 9,807† 8,147¼	42 50 40	322† 196† 203†	Good drainage; closets old; 1 in good repair, and 1 poor.	No arrangement for ventilation.	Furnace, coal.
Albion Village District No. 1, Ward School No. 2.	Stone and brick...	2	6,255† 6,863†	42 25	148† 274†	No drainage; closets old but clean, not ventilated.	No ventilation in either room.	Coal stoves.
Albion Village District No. 1, Ward School No. 3.	Frame	1	6,420†	30	214†	No drainage; closets in good condition.	None whatever......	Coal stove.

(a) The report says 10; but that includes the laboratory, office and reception room, 2 recitation rooms and 2 other rooms whose use is not stated; there are only 4 regular class rooms.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Aquetuck, Coeymans, No. 16.	Seats at right angles with windows.	9 to 12, 1 to 4, 6	Yes	Yes	The building is nearly new, in good repair; the play-ground should have brush, weeds, etc., cut, stumps pulled and ground graded.
Indian Fields, Coeymans, No. 17.	Windows at right and left of pupils.	9 to 12, 1 to 4, 6	Yes	Yes	None given.
Deposit	The senior study has light from both sides; the academic study has light from back and left side; the primary study from back and right side; the intermediate study from the back and both sides; chapel from back, front, and both sides; the recitation-room from front, back and right side, 1 from back and left side, and 1 from right side only.	9 to 11.45; 1 to 3.30, 5¼	Are allowed in primary department only.	Yes	Number of pupils too great for part of the rooms; the light is insufficient in primary and academic rooms part of the day; ventilation is entirely through doors and windows, and fresh air supplied in same way, with a few exceptions; building is good, built in 1882. There is a chapel on the second floor, which is also used for recitation, which contains 71,808 cubic feet; on the first floor there are two recitation rooms, containing 4,446 cubic feet each, and one containing 5,460 cubic feet; there is also on this floor a library, which contains 3,458 cubic feet, and a trustees room, containing 3,458 cubic feet.
Town of Elmira, District No. 1.	Mostly side lights; two or three seats have windows behind.	9 to 12, 1 to 4, 6	Yes	Yes	The reply to suggestions for improving present condition is, tear down old house and build a decent one; no other remedy possible.
Town of Elmira, District No. 2.	Side and rear windows	6	Yes	Yes	The reply to suggestions for improving present condition is, a new school-house; old one in bad condition; worst house in town; dilapidated outside and inside; a disgrace to a truly civilized community.
Town of Elmira, District No. 3.	Side and rear lights	6	Yes	Yes	There are recesses of fifteen minutes during morning and afternoon sessions; the reply to suggestions for improving present condition is, wretched old school-house; replace by new one.
Town of Elmira	Side and rear lights	6	Yes	Yes	The reply to suggestions for improving present condition is, make better ventilation.
Town of Elmira, District No. 5.	Side light	6	Yes	Yes	Best house in town, yet has no provision for ventilating, except windows and doors.
River Road, Town of Elmira, District No. 6.	Side light	9 to 4 P. M.; one hour intermission at noon. 6	Yes	Yes	There are two recesses of fifteen minutes each forenoon and afternoon; the reply to suggestions for improving present condition is, change ventilation.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Albion Village, District No. 1, Ward School No. 4.	Stone	2	6,498† 8,328†	38 42	171† 196†	Poor drainage, water standing in cellar; closets old and in bad condition.	Neither room has any provision for ventilation.	Coal stove in each room.
Albion Village, District No. 1, Ward School No. 5.	Stone; good.......	1	8,548†	40	213†	Drainage poor; cellar damp and foul; closets good.	No ventilation	Coal stove.
Town of Albion, District No. 2.	Frame	1	5,865	30	195†	Drainage good; closets poor.	One opening in chimney, 10x12 in.	By wood fire.
Town of Albion, District No. 3.	Frame	1	7,800	25	312	Drainage good; closets new, without ventilation.	Outlet in ceiling, 10x14 in.	By wood fire.
Town of Albion, District No. 4.	Stone	1	7,524	20	376†	No drainage; closets good	No ventilation.	Wood stove.
Town of Albion, District No. 5.	Stone	1	8,007†	30	266†	No drainage; none needed; closets good.	No ventilation.......	By wood stove in center of room.
Town of Albion, District No. 6.	Stone	1	5,650†	15	376†	No drainage; closets poor.	No ventilation	By coal fire.
Town of Albion, District No. 7.	Frame	1	5,088⅛	15	339†	No drainage; none needed; closets fair.	No ventilation	By coal fire.
Town of Albion, District No. 8.	Stone, with wood attachment.	1	5,670	10	567	No drainage; closets very poor.	No ventilation	By wood fir
Town of Albion, District No. 9.	Wooden	1	6,971¼	12	580†	No drainage; drainage much needed; closets very poor.	No ventilation	By wood stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Carr's Corners, Town of Elmira.	Mostly side light	6, including recesses.	Yes	Yes	(a)
Ellenville, Ulster Co.	Six rooms are lighted from side and end, the remainder side light.	In some departments 5 hours, usually 6 hours.	Yes, except where 2½ hours make a session.	Yes	The reply to suggestions for improving present condition is, better ventilation in some of the rooms, if not all, and that each teacher should in all school rooms be required to have a current of fresh air enter and pass their rooms every hour.
Albion Village, District No. 1. High School Building.	Side and rear light	6	Yes	Yes	(b)
Albion Village, District No. 1, Central Ward School No. 1.	Side and rear light	5½	Yes	Yes	The building is new and good; the reply to suggestions for improving present condition is, improvement in ventilation. This is a new building with absolutely no means of ventilation.
Albion Village, District No. 1, Ward School No. 2.	Room A. rear and front light; room B, rear, front and side light.	5½	Yes	Yes	The building is in fair condition; the reply to suggestions for improving present condition is, ventilation.
Albion Village District No. 1, Ward School No. 3.	Side light	5½	Yes	Yes	The building is low and in good repair; the reply to suggestions for improving present condition is, ventilation.

(a) There is a recess in morning and afternoon of 15 minutes. The reply to suggestions for improving present condition is, improve ventilating apparatus. There is besides the large room a small room 10x12x14=1,680 cubic feet (which report calls a class-room); the average is that of last year, and of course part of pupils are in class-room nearly all the time, but assuming 40 in large room all the time, that gives 560 cubic feet for each pupil; a large amount, but ventilating apparatus is very poor. 4 opening at top beyond control, 4 at bottom about 6 inches across and more than half closed; most of the school-houses are poor; several are a disgrace to any community claiming even a moderate degree of intelligence; in only one has any attempt been made at ventilation and that is a very weak one.

(b) There is a recess of ten minutes A. M. and P. M.; the reply to suggestions for improving present condition is, better light and good ventilation; light is insufficient; on clear days cross-light is troublesome to students; in addition to the class-rooms there is a laboratory whose cubic contents is 6,775 1-6 cubic feet, an office and reception room which contains 6,136 cubic feet; there are also four other rooms, two of 6,660⅛ cubic feet each, one of which is used for a recitation room and the use of the other is not given, and two of 7,257¼ cubic feet each, one of which is used for a recitation room and the use of the other is not given. The building is first class, in good repair.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Albion, District No. 10.	Wood.	1	7,560	20	378	No drainage; closets poor; no drawer or vault.	No ventilation	Wood stove.
Ellicott, District No. 2	Not given	1	6,624	20	331†	All right	By windows and one small ventilator in ceiling.	By wood.
Ellicott, District No. 3	Wood.		6,072	21	289†	Good.	By six ventilators opening into the garret.	By wood.
Ellicott, District No. 4	Good, except floor.	1	11,088	30	369†	Good.	By windows	By wood.
Ellicott, Dexterville, District No. 5.	Wood.	2	5,236	39	134†	Good.	One has but windows; other has a register in ceiling.	By gas.
Ellicott, Falconer, District No. 6.	Good	2	4,400 5,280	37 37	118† 142†	Good	By ventilators running from registers in floor to room above.	By wood.
Ellicott, District No. 7	Very poor.	1	5,160	23	224†	Good	No proper ventilation	By wood.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Albion Village, District No. 1, Ward School No. 4.	Room A, light from rear and front and left side poor; Room B, light from side and rear, 4 windows.	6	Yes	Yes	The building has a good appearance. The reply to suggestions for improving present condition is, drainage, light, ventilation need improving. This building is in poorer condition than any other in the village; cellars are unwholesome.
Albion Village, District No. 1 Ward School No. 5.	Side and front light	5½	Yes	Yes	Ventilation and clean dry cellar needed.
Town of Albion, District No. 2.	Side and rear light	5	Yes	Yes	Recesses are from 10 to 15 minutes A. M. and P. M.; the building is new and in good repair. The reply to suggestions for improving present condition is, ventilation of school-room and closets, closets are new, but hygienic qualities of same are very poor.
Town of Albion, District No. 3.	Rear and side light	6	Yes	Yes	The building is new and in good repair; the recesses are 10 to 15 minutes. The reply to suggestions for improving present condition is, ventilation of school-room and closets.
Town of Albion, District No. 4.	Side and rear light	6	Yes	Yes	The building is in good repair. The reply to suggestions for improving present condition is, improvement in ventilation.
Town of Albion, District No. 5.	Side and rear light	6	Yes	Yes	The building is old and poor. The reply to suggestions for improving present condition is, better ventilation and light.
Town of Albion, District No. 6.	Side and rear light; insufficient.	6	Yes	Yes	The recess is for fifteen minutes; the reply to suggestions for improving present condition is, ventilation and light; three students near-sighted; the building is old and poor.
Town of Albion, District No. 7.	Good light; side and rear.	6	Yes	Yes	The building is in good repair within; the reply to suggestions for improving present condition is, proper ventilation of house; the recess is for fifteen minutes.
Town of Albion, District No. 8.	Light from side and rear; insufficient light.	6	Yes	Yes	The recess is for fifteen minutes; the building is old, rickety and poor; the reply to suggestions for improving present condition is, new house on improved plans.
Town of Albion, District No. 9.	Side and rear light	6	Yes	Yes	The building is small and poor; the reply to suggestions for improving present condition is, correct sanitation and cleanliness.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation	Heating.
Town of Albion, District No. 10.	Wood.	1	7,560	20	378	No drainage; closets poor: no drawer or vault.	No ventilation	Wood stove.
Ellicott, District No. 2	Not given	1	6,624	20	331†	All right	By windows and one small ventilator in ceiling.	By wood.
Ellicott, District No. 3	Wood.		6,072	21	289†	Good.	By six ventilators opening into the garret.	By wood.
Ellicott, District No. 4	Good, except floor.	1	11,088	30	369†	Good.	By windows	By wood.
Ellicott, Dexterville, District No. 5.	Wood.	2	5,236	39	134†	Good.	One has but windows; other has a a register in ceiling.	By gas.
Ellicott, Falconer, District No. 6.	Good	2	4,400 5,280	37 37	118† 142†	Good	By ventilators running from registers in floor to room above.	By wood.
Ellicott, District No. 7	Very poor.	1	5,160	23	224†	Good	No proper ventilation	By wood.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Albion, District No. 10.	Side and rear light	6	Yes	Yes	(a)
Ellicott, District No. 2	All right	9 A. M. to 4 P. M. 7	Yes	Yes	The building needs painting and new seats. The suggestions offered for improving present condition are, new seats and new ventilation; seats are old wooden and should be changed.
Ellicott, District No. 3	Good	9 A. M. to 4 P. M. 7	Yes	Yes	Found out-houses in a bad condition.
Ellicott, District No. 4	Good	9 A. M. to 4 P. M. 7	Yes	Yes	The suggestions offered for improving present condition are, new seats and new floor. If there were some ventilators in ceiling they would help the condition of air and ventilation. Should have new style of seats as present ones are old wooden ones.
Ellicott, Dexterville, District No. 5.	One room bad	9 to 4. 7	Y s	Yes	One room should have better light on one side, and one room should be better ventilated; and rooms should be enlarged.
Ellicott, Falconer, District No. 6.	Good	9 A. M. to 4 P. M. 7	Yes	Yes	(b)
Ellicott, District No. 7	All right	9 A. M. to 4 P. M. 7	Yes	Yes	The suggestions offered for improving present conditions are, new seats and new school house; the school house is very poor; teacher told me that scholars actually suffered with cold and she could not keep warm; it will not pay to repair the school-house, but a new one should be built.

(a) The building is poor inside. The reply to suggestions for improving present condition is, drainage and ventilation. You will see that the school buildings in this town and village are sadly in need of ventilation, and I may say, also, drainage; the farmers in the country, when building a new school-house, are in total ignorance of the first principles of hygiene, and sanitation does not enter into the idea and plans for a school-house. The buildings in the village are but little better. The school board or board of education of Albion are old men who know nothing of sanitation and will do but little in the way of its regulation, even at the request of the teachers, who, with the students, suffer from this gross neglect. If a circular from your honorable body could reach this village and open the eyes of the people on this subject, a vast amount of public good might be accomplished.

(b) The ventilation is not good as the ventilators are not finished; one is stopped entirely and both are worse than none, as the school-house is arranged; the upper room is larger than either lower room and is not finished, and those two ventilators open into this unfinished room, consequently the pressure of air above is so great that the draft is in the wrong direction, and a constant current of air is coming up under the children's feet; would suggest that the room above be finished and that the ventilators be run into a chimney or open into garret above; also the one that is shut be opened as soon as room above is finished.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Fulton, Schoharie Co., Vrooman's Land, District No. 15.	Frame	1	11,520	50	230†	No drainage; there is a degrading and disgusting condition of the outhouse.	By the windows and doors.	By wood stove.
New London............	Brick, 2 story......	2	11,250	45	250	Good...................	Badly ventilated; cold air admitted on level with floor.	By coal stoves.
Durhamville..............	Two story wood, with cellar.	3 { Larger. 2 smaller.	12,960 6,000	60 30	216 200	Good...................	Ventilated erroneously; cold air admitted on level with floor.	By 2 furnaces.
Higginsville..............	One story wood...	2	5,000 3,000	40 20	125 150	Good...................	By doors and windows.	By stoves.
Town of Fulton, Schoharie Co., Vintonton, District No. 16.	Poor..............	1	3,933	30	131†	Not any drainage	Ventilated by windows.	By a common wood stove.
Preston, Chenango Co	8 schools; wood...	1 { Dist. No. 1 2 3 4 5 6 7 8	3,320 3,700 1,984 6,420 3,952 3,420 4,410 5,920	9 17 5 10 13 7 19 11	368† 217† 396† 642 304 488† 232† 538†	No drainage; character of closets, wood.	By windows, top and bottom.	By stoves; sheet and cast iron.
Yonkers	There are 7 school-houses in district; very good brick buildings, with only 2 exceptions.	From 1 to 22	Will range from 6,000 to 30,676 cubic feet.	50	(b)	Four use privy vaults and three have good sewer connections.	Generally by open windows; one building is provided with ventilating shafts.	One house by steam and the other six by hot air furnaces.
Hamlin	There are 15 school-houses in town; there are only about 3 in town that are in good condition as to buildings.	1	(a)	About 15 daily average attendance.	....	Soil drainage; closets are all bad.	By doors & windows.	By stoves; mostly with coal; a few with wood.

(a) They are of different sizes, ranging from 24x30 to 18x24 feet in size.

(b) The average space for each pupil in these schools is about 175 cubic feet.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Ellicott, Lakewood, District No. 8.	All right	9 A. M. to 4 P. M.. 7	Yes	Yes	(a)
Ellicott, District No. 9	Good	9 A. M. to 4 P. M.. 7	Yes	Yes	The suggestions offered for improving present condition are, new seats and more ventilation; wooden seats of old style and should be changed.
Ellicott, Ross Mills, District No. 10.	Good	9 A. M. to 4 P. M.. 7	Yes	Yes	The suggestion offered for improving present condition is, should be about six ventilators in ceiling.
Ellicott, District No. 11	Good	9 A. M. to 4 P. M., 7.	Yes	Yes	(b)
Clarkstown, District No. 1	Good; windows at back and sides.	6	Yes	Yes	None given.
Clarkstown, District No. 2	Good	6	Yes	Yes	None given.
Clarkstown, District No. 3	Good	6	Yes	Yes	None given.
Clarkstown, District No. 4	Good	6	Yes	Yes	None given.
Clarkstown, District No. 5	Good	6	Yes	Yes	The cubic dimensions of the second room, the one not used at present, is 17x16½x12 or 3,366 cubic feet.
Clarkstown, District No. 6	Good	9 to 4, 7 hours	Yes	Yes	None given.
Clarkstown, District No. 7	Good	9 to 3.30, 6½ hrs.	Yes	Yes	They are about erecting a new school-house of which I will send report when finished.
Clarkstown, District No. 8	Windows, back and sides	9 to 3 P. M.,6 hrs.	Yes	Yes	None given.
Clarkstown, District No. 9	Good	6	Yes	Yes	None given.
Puncetown, District No. 8	Side light and rear	6	Yes	Yes	School-house is in good condition.
Town of Fulton, Schoharie Co., Breakabeen, District No. 4.	Side lights	6	Yes	Yes	The suggestions offered for improving present condition are, new seats, two rooms, more ventilation; the closet should be farther from building, it being now but fifteen feet; the building is in fair condition
Town of Fulton, Schoharie Co., District No. 7.	Lighted from side	6	Yes	Yes	The suggestion offered for improving present condition is, more proper ventilation; the building is in good condition
Town of Fulton, Schoharie Co., District No. 11	Side light, right and left.	9 to 12 A. M., 1 to 4 P. M. 6	Yes	They are to a certain extent.	There is a recess of five minutes each half day; the suggestion offered for improving present condition is, that the school ground be provided with two closets instead of one as it now is with a partition between, one part for the girls the other for the boys.

(a) There should be either a new floor in the school-house or a new wall under it, both would be better; also should have some way of ventilation from the ceiling; seats are old wooden ones and should be changed as children are in misery all the time; also they are not made of different heights and small scholars have to let their feet hang off without touching the floor.

(b) The suggestion offered for improving present condition is, should be some ventilation other than the windows. In the town of Ellery, joining Ellicott, there is a school house in bad condition; the privies are in the wood-shed which is attached to the rear of the school-house; the scholars say that the odor is very bad; they have no health officer and that is why it has not been attended to. The district is a joint district with Ellicott and is located at Fluvanna Some of the patrons are desirous of having the matter remedied.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Pittsford, Monroe Co....	One stone, 1 wood.	Three in stone building, one in wood building.	12,177 5,859 6,264 5,022	40 40 45 60	304† 146† 159† 83†	No special drainage; vaults poor.	Special ventilators around the ill-fitting window sashes.	Rooms 1, 2, 3, by a furnace; 4th room in wood building by a stove.
Carmel Village, Putnam county.	New frame building.	2	912	28	246†	Closets out dry side (sic.); drainage good.	By windows and by ventilator in ceiling overhead 15x15.	By furnace.
Village of Middletown, Orange Co., Academy	Brick	5	9,771	39†	245†	Closet is a portable box, so-called earth closet; cleaned twice a year.	By flues in walls and windows.	By stoves.
Village of Middletown, Orange Co., School No. 1.	Brick	3	9,513	41†	228†	Closets are portable boxes, cleaned twice a year.	By flues in walls and windows.	By stoves
Village of Middletown, Orange Co., School No. 2.	Brick	7 The seventh room is an annex, which is rented.	8,151†	44†	181†	Sewer flushed daily; cement vault for annex.	By flues in walls and windows; annex by windows only.	By stoves; annex by furnace.
Village of Middletown, Orange Co., School No. 3.	Brick	6 Rooms 5 & 6 are rented rooms.	7,600	47†	158†	Closets are port'ble boxes, cleaned twice a year.	By windows and flues; annex by windows only.	Both school build'g proper and annex by stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangements of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Fulton, Schoharie Co., Vrooman's Land, District No. 15.	Windows on three sides of room, seats face dark side.	9 to 12, 1 to 4, 6	Yes	Yes	The building should be enlarged and properly ventilated, and a new closet should be built with proper drainage.
New London	Windows at side and rear of pupils.	6	Yes	Yes	The suggestion offered for improving present condition is, higher seats for pupils.
Durhamville	Windows at side and rear of pupils.	9 to 12, 1 to 4, 6	Yes	Yes	The suggestion offered for improving present condition is, a better system of ventilation. A new building was erected four years ago at a cost of $5,000.
Higginsville	Windows at side of scholars.	6	Yes	Yes	It is a common country school-house with two rooms, one room in rear of other. There is a new school building to be erected this summer at Verona; the new school-house is to cost about $6,000, and have two, and perhaps three departments. I presume it will be ventilated about like Durhamville and New London; these are the four principal school-houses in my town; the 21 others are common country school-houses, one class-room and a large stove in the center of each. This is the extent of information the board has arranged to give, so I will close.
Town of Fulton, Schoharie Co., Vintonton, District No. 16.	Seats are arranged so the scholars sit with their backs toward the windows.	9 till 4... 7	Yes	Not as a rule	The suggestion offered for improving present condition is, build larger or new; this school-room should be larger and properly ventilated.
Preston, Chenango Co.	Light comes in side and back.	6	Yes	Yes	(*a*)
Yonkers	Generally so as to admit light over the left shoulder.	9 to 11.30, 1 to 3, 4½	No	Yes	The reply to suggestions for improving present condition is, I would suggest a better system of ventilation.
Hamlin	Light mostly from the sides; all from sides and back.	6	Yes	Yes	The school-houses in this town, as a whole, are in a bad condition, being built years ago; they are small in size and low between floor and ceiling, hardly any of them being twelve feet high, very poorly ventilated and not very well heated.

(*a*) The reply to suggestions for improving present condition is, none without abrogating the style generally; lights should be arranged without cross-lights or shadows; either from above or raised light behind the scholars, that they may have direct light; I have taken teachers' statements for the average in No. 2; there cannot be an average of seventeen, although that number was present; every house is wood and on dry ground; all accommodated with water near by; all have windows on three sides; light enough and more; all have blinds or adjustable curtains; some of them both; all warmed by stoves, sheet and cast iron; no weak eyes; one myopic scholar; all healthy.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Pittsford, Monroe Co....	One stone, 1 wood.	Three in stone building, one in wood building.	12,177 5,859 6,264 5,022	40 40 45 60	304† 146† 139† 83†	No special drainage; vaults poor.	Special ventilators around the ill-fitting window sashes.	Rooms 1, 2, 3, by a furnace; 4th room in wood building by a stove.
Carmel Village, Putnam county.	New frame building.	2	912	28	246†	Closets out dry side (sic.); drainage good.	By windows and by ventilator in ceiling overhead 15x15.	By furnace.
Village of Middletown, Orange Co., Academy	Brick	5	9,771	39†	245†	Closet is a portable box, so-called earth closet; cleaned twice a year.	By flues in walls and windows.	By stoves.
Village of Middletown, Orange Co., School No. 1.	Brick	3	9,513	41†	228†	Closets are portable boxes, cleaned twice a year.	By flues in walls and windows.	By stoves
Village of Middletown, Orange Co., School No. 2.	Brick	7 The seventh room is an annex, which is rented.	8,151†	44†	181†	Sewer flushed daily; cement vault for annex.	By flues in walls and windows; annex by windows only.	By stoves; annex by furnace.
Village of Middletown, Orange Co., School No. 3.	Brick	6 Rooms 5 & 6 are rented rooms.	7,600	47†	158†	Closets are port'ble boxes, cleaned twice a year.	By windows and flues; annex by windows only.	Both school build'g proper and annex by stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Pittsford, Monroe Co.	Light at sides and back.	8 A. M., 2½ P. M., 5½	No.	Yes.	The suggestion offered for improving present condition is, more room in No. 4; the main building is of stone, with small windows, and is very gloomy; there is no drainage, and the ventilation is by raising the sashes and placing a board under the lower, allowing a draught on the student next to the window.
Carmel Village, Putnam county.	Windows right and left and in front.	8 A. M., 3 P. M., 6	Yes.	Yes.	There is a recess of fifteen minutes in each session; the ceilings are high — twelve feet; the furnace takes its air supply from the floor of each class-room, instead of getting it outside, as could as easily be done; sanitary condition good otherwise.
Village of Middletown, Orange Co., Academy.	(*a*)	5	(*b*.)	Yes.	Besides the 5 class-rooms there is a recitation-room containing 7,059 cubic feet, and lighted by 4 windows on left side and 4 on right side; there is no cloak-room; hall used for that purpose, ventilation very imperfect; window boards might improve it to some extent; building in first-class order; no place for cloak-room; building completely overhauled this past summer.
Village of Middletown, Orange Co., School No 1.	Room 1 is lighted from left and right; room 2 from left; room 3 from right.	5	(*b*.)	Yes.	No cloak-room; hall used for cloak-room; imperfect ventilation; building in good repair.
Village of Middletown, Orange Co., School No. 2.	2 rooms are lighted from left and right; 4 rooms from rear, left & right, and 1 from rear & right side; this latter is the rented room.	5	(*b*.)	Yes.	No cloak-room; hall used as cloak-room; imperfect ventilation; rented room, only window ventilation; the building is in good repair.
Village of Middletown, Orange Co., School No. 3.	The 4 rooms in school building proper are lighted on rear and two sides; the 2 rooms in annex are lighted on rear and two sides also.	5	*b*.)	Yes.	The school building proper is in good repair; ventilation may be much improved easily by using an extra flue not now in use; rented room, no cloak-room; hall used; no ventilation.

(*a*) Room 1 has 2 windows in front, 2 in rear, and 4 on left side; room 2 has the same number of windows, and situated the same as those in room 1; room 3 2 in front, 2 in rear, and 4 on right side; room 4 has the same number of windows, and situated the same as those in room 3; room 5 has 2 windows in rear and 4 on left side.

(*b*.) Recesses morning and afternoon in all primary rooms, but in the grammar grades the recess is omitted in the afternoon. It is omitted entirely in the academy. (This note on recesses applies to all the schools.)

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Walton Academy.........	Wood.............	Chapel, 3 others; 4 rooms.	26,565 8,777.375	65 65	408† 135†	No drainage; closets common privies.	Ventilation only by windows.	By stoves; hot air furn'e now being put in, with branch pipes to halls and rooms.
School No. 2, Walton	Wood.............	2	5,615.5	65	86.3†	Poor drainage; closets, common privies.	Ventilation by windows.	By stoves.
School No. 3, Walton	Wood.............	1	8,448	65	129†	No drainage; closets, common privies,	Ventilation by windows.	By stoves.
Mountain House, Port Jervis.	Good..	14, but cubic contents of only 13 are given.	11,275†	43.4	259†	Good....................	By ventilators and windows.	By steam.
Main Street School, Port Jervis.	Very bad..........	4	8,698.93¾	59.3	146†	Closets are privies; the vaults are in a fair condition..	By windows.........	By stoves.
Church Street School, Port Jervis.	Fair...............	3	13,929⅝	109⅝	127†	The privies are in a fair condition.	By windows.........	By stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Village of Middletown, Orange Co., School No. 4.	The 4 rooms are all lighted from the rear and two sides	5	(*a.*)	Yes	The building is in good repair; the heating is not sufficient; no cloak-room; hall used; imperfect ventilation; lacks heat in severe weather; privies want repair.
Village of Middletown, Orange Co., School No. 5.	4 rooms are lighted from the rear and left side, and 4 from the rear and right side.	5	(*a.*)	Yes	(*b.*)
Ridge Street Primary, Glens Falls.	Light from three sides	9 to 11.45, 1.15 to 4 5¼	No	Yes	This is a two-story building; the second story substantially the same as as the first.
Central Building, Glens Falls.	Light comes from back and left side in each case.	9 to 11.45, 1.15 to 4 5¼	No	Yes	This is a new school building; the second floor is the same as the first, except there is a small room over front hall; third floor all one room, used for assembly purposes; each room has forty-two single desks; each wardrobe has 1,650 cubic feet, and is lighted, heated and ventilated; the library and two similar small rooms in second story have 3,217 cubic feet each; the assembly room has a 16-foot ceiling; the teacher's desk is movable and may be so placed that the teacher gets very little light in face direct.
South Street Primary, Glens Falls.	Poorly lighted	9 to 11.45, 1.15 to 4 5¼	No	Yes	This is a very old one-story building; to be thorougly remodeled and carried up another story as soon as the board can secure an appropriation for that purpose; the two larger rooms are divided by a partition about seven feet high running near to stove, thus making five rooms; the average attendance in each is about thirty.
Park Street Primary, Glens Falls.	Lighted from two sides	9 to 11.45, 1.15 to 4 5¼	No	Yes	There are single desks for fifty-six pupils.
Glen Street Primary, Glens Falls.	Both rooms lighted from two sides.	9 to 11.45, 1.15 to 4 5¼	No	Yes	This is a one-story building; one room has single desks for forty-eight and the other has single desks for forty-five.

(*a.*) Recess morning and afternoon in all primary rooms, but in the grammar grades the recess is omitted in the afternoon. It is omitted entirely in the academy. (This note on recesses applies to all the schools.)

(*b.*) The building is in the best of order; this is the best of all our buildings; cloak-room off of each room, between that and next room; well ventilated; rooms on each corner of building, hall through center, large and airy. With present arrangement of buildings it will be hard to get proper ventilation in most of the buildings; in a few of the rooms the stoves are not sufficient to the severest weather; the buildings are all good, substantial and well built, of brick; all two stories high, except the academy, which is three, and the annexes, one of which is in a church. All, except the annexes and No. 1, have halls running from front to rear, dividing the building nearly into equal parts both above and below. Buildings all located on ground easily and well drained; cellars all dry and in good condition, but one annex, which has running water underneath it.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Germantown School Building, Port Jervis.	Good.	2	11,875	91.2	130+	Drainage good; the privies are in a fair condition.	By ventilators and windows.	By stoves.
Riverside School Building, Port Jervis.	Not given.	2	6,300	49	128+	Not given.	By windows.	By one stove in each room.
Village of Hyde Park.	Brick.	2	15,868½	104	152+	Ordinary vault closets in yard.	Only by windows.	By ordinary coal stoves, one in each class-room and one in each recitation room.
Penn Yan.	Good.	Academy 3	29,140⅓	100	291+	Cesspools.	By windows and shaft from cellar to roof beside chimney.	Academy by steam; Grammar schools by stoves.
Chateaugay.	Brick.	5, 1 in 3d story; 4 in others.	29,250 10,800	30 43¾	975 246+	No drainage; no vaults to closets; deposits removed.	Fairly ventilated by side registers.	By a coal stove in each room.
Stockport, Post Office, Stottville.	There are 4 schools in district (A, B, C, D); all frame except C.	A has 2, B has 1, C has 1, D has 1.	10,281¼ 7,402½	60 65	171+ 113+	Closets have no drainage, they are new closets in good condition.	Ventilated only by the windows.	By coal stoves.
			16,000 8,000 5,000	40 35 40	400 228+ 125	Closets of all have vaults and no drainage.	By windows and doors except B, which has a scuttle-hole overhead 2x2½ feet.	All by stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Walton Academy...... ...	Chapel lighted from front, rear and left side; one class-room is lighted from three sides, the other two are lighted from two sides.	9 to 12, 1 to 4.... 6	Yes.......	Yes, by permission.	There is a recess of ten minutes twice a day; the chapel is also used as a class-room; there are two other rooms in the building, one a laboratory, the other a library.
School No. 2, Walton	One room is lighted from two sides, the other is lighted from three sides.	9 to 12, 1 to 4.... 6	Yes.....	Yes, by permission.	There is a recess of ten minutes twice a day.
School No. 3, Walton	Lighted from two sides.	9 to 12, 1 to 4.... 6	Yes.............	Yes, by permission.	The building is one story; there is a recess of ten minutes twice a day; I have had made accurate drawings of the several school buildings, the examination of which will give more definite answers to the inquiries contained in the blank you sent me; you will learn from them that the great defects to be remedied are want of ventilation and drainage; School District No. 1, of town of Walton, comprises Walton Academy and Union School under control of the board of education.
Mountain House, Port Jervis.	Good light from 1 side and rear of pupils in all rooms but 1; that 1 has windows upon 1 side and in front of pupils.	9 to .40 .. M.; 1.15 to 3.30 P. M.; 4 hrs., 55 min.	No.............	Yes............	The first floor hall contains 7,866 cubic feet; the second floor hall contains 10,462 cubic feet; the third floor hall 9,920 cubic feet; and the fourth floor hall 15,444 cubic feet; the halls are all ventilated by doors and heated by steam.
Main Street School, Port Jervis.	Rooms A, B, and C, are lighted from front and one side; room D has 5 windows, but their location is not given.	9 to 11.40 A. M.; 1.15 to 3.30 P.M.; 4 hrs., 55 min.	No........	Yes.........	(*a*)
Church Street School, Port Jervis.	Light comes from both sides of the school room.	9 to 11.40 A. M.; 1.15 to 3.30 P.M.; 4 hrs., 55 min.	No....	Yes.............	(*b*)

(*a*) The reply to suggestions for improving present condition is, a new school building; this building has been used for over thirty years as a school-house; it is entirely inadequate for the number of scholars who attend. Room A has one window 2 ft. 10x5 ft. 4 in front of pupils and near the privy; six windows upon one side of room, four of which can be partially opened; seats and desks poor and about 4½ to 5 ft. long; four to five pupils upon each seat; a number of colored children in the room; ventilation very poor; average age of pupils about seven years. Room B is over room A, and does not differ materially from the description of Room A, except there are not so many colored children in it. Room C, has five windows upon one side 2 ft. 10x5 ft. 2; one end window in front of pupils. Room D has five windows and two doors.

(*b*) The school has, besides the three class-rooms, five recitation rooms, each of which contains 3,066 cubic feet, and in which 25 pupils from the class-rooms remain from twenty to twenty-five minutes; the cellar is damp; two of the class-rooms have each three windows upon each side of room; the number of windows to the other rooms is not stated; from the figures given above the average air space *per capita* for the recitation rooms is found to be 122 16-25 cubic feet.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building	Number of class-rooms	Average cubic dim of each class-room.	Average number of pupils in each	Average air space per capita	Closets and dramage	Ventilation	Heating
Town of Onondaga, School District No. 1, Onondaga Academy	Brick	3 {No. 1 No 2 No 3	34,587 9,338 15,379	80 38 68	432† 245† 226†	Closets have stone vault; no drainage; the closets are in a brick building	By raising and lowering windows and ventilators	By stoves
Town of Onondaga, School District No. 3.	Stone	1	5,850	47	124†	No drainage; earth closet	By transom and by raising and lowering windows	By stoves
Town of Onondaga, School District No. 4.	Wooden	2 {No 1 No. 2	7,776 6,048	37 25	210† 241†	No drainage, vault closet	By raising and lowering windows	B- stoves
Town of Onondaga, School District No. 5.	Stone	1	4,800	2 or 3	2,400 or 1,600	No drainage, earth closet, old and in bad shape	By raising and lowering windows	By stove
Town of Onondaga, School District No. 6	e	1	9,361	50	187†	Vault closet; no drainage	By transom and raising window by window board.	By stoves

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Germantown School Building, Port Jervis.	Each room has 3 windows upon each side of room, and 2 in rear of pupils.	9 to 11.40 A. M.; 1.15 to 3.30 P. M.; 4 hrs., 55 min.	No..	Yes............	The school has, besides the two class-rooms, three recitation rooms, containing 2,152 cubic feet each; in which 20 to 25 pupils from the class-rooms remain for twenty minutes during recitation; from these figures the average air space *per capita* is found to be from 86 2-25 cubic feet to 107 3-5 cubic feet; there is 1 stove in each of these rooms and they are ventilated by ventilators and windows
Riverside School Building, Port Jervis.	Each room is lighted from the rear, front and side.	9 to 11.40 A. M., 1.15 to 3.30 P. M., 4 hours, 55 min.	No	Yes..	The building was formerly a dwelling; it is not at all adapted for school purposes. The reply to suggestions for improving present condition is, new school building.
Village of Hyde Park. .	(a)	6	Yes...	Yes..	(b)
Penn Yann..............	The light is good except in main room at Academy; light from 3.45 to 4.30 is bad from October 15 to March.	9 to 12 A. M., 1 to 4.30. 6½	Yes..	Yes........... .	There are five school houses in district, but the cubic dimensions of the class-rooms and the number of scholars in each are only given for the Academy. The Academy has three class and eight recitation rooms. Lake street one class-room; Chestnut street two class-rooms; Maiden lane two class and three recitation rooms; Head street two class-rooms. The recitation-room at the Academy contain 3,000 cubic feet; the recitation rooms at other schools contain 2,000 feet.
Chateaugay	Upper room has light on all sides; lower rooms have light sides and back.	5½	Yes, in the two lower rooms.	Yes.............	The reply to suggestions for improving present condition is, the condition of the closets is not the best; in regard to drainage none appears necessary, as the building is located on a sandy elevation of ground and of about four acres in extent, and no barn or dwelling-house within 20 rods of it; the building is three story.
Stockport, Post Office, Stottville.	Seats are so arranged that the light comes from the back and sides of the pupils.	9 to 12, 1 to 4.... 6	Yes, 15 minutes in morning and 15 in afternoon.	Yes.............	I would suggest draining the closets if it could be done, but I do not see how one of them can be without making things worse than they now are; I am very much in favor of good ventilation; this is a good frame building with good cellar under entire building.
	All lighted by windows on sides, A and D on rear.	3 hrs. morning & afternoon, 6 hrs.	Yes....	Yes.....	Buildings A and B are nearly new.

(*a*) On the first floor there are windows on north and south sides, and seats face west; three windows each side; three windows in each recitation room; on the second floor the windows are on the north and south sides, with seats facing south, but none very near south windows.

(*b*) The building is a good one, two-story; it has besides the two class-rooms, three recitation rooms, one on first floor containing 2,436 cubic feet and in which twenty scholars go to recite, which gives to each scholar an air-space of 121 4-5 cubic feet, and two on second floor, one containing 2,636 cubic feet, and in which twenty-two scholars go to recite giving an average air-space *per capita* of 119 9-11 cubic feet, and one containing 2,700 cubic feet, and in which sixteen scholars go to recite which gives to each scholar an air space of 168¾ cubic feet; the reply to suggestions for improving present condition is, that the building be warmed by a good furnace, with cold air box from outside, and to put in ventilating tubes to lead from baseboard in each room to roof of building

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*)

PLACE.	Character of building	Number of class-rooms	Average cubic dim of each class-room	Average number of pupils in each	Average air space per capita	Closets and drainage	Ventilation	Heating
Town of Onondaga, School District No. 7.	Brick	1	8,526	43	198†	No drainage, earth closet	By raising and lowering windows	By stove.
Town of Onondaga, School District No. 8.	Wooden	1	6,325	19	332†	No drainage, earth closet	By raising and lowering windows	By stove
Town of Onondaga, School District No 9.	Wooden	1	13,728	18	762†	No drainage. earth closet	By raising and lowering windows.	By stove.
Town of Onondaga, School District No. 10.	Wooden	1	4,653	12	387†	No drainage. earth closet, old.	By raising and lowering windows.	By stove.
Town of Onondaga, School District No. 11.	Stone	1	4,200	25	168	No drainage; earth closets	By raising windows; 2 can be lowered; very poor ventilat'n	By stove.
Town of Onondaga, School District No. 12.	Wooden.	1	5,940	12	495	No drainage, earth closet, old.	By raising and lowering windows	By stove.
Town of Onondaga, School District No. 13.	Wooden	1	4,560	22	207†	No drainage, earth closet	By raising and lowering windows	By stove.
Town of Onondaga, School District No. 14.	Wooden	1	7,307	11	664†	No drainage, earth closet.	By raising and lowering windows	By

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Onondaga, School District No 7	Light at sides and back.	6	Yes	Yes	The building is wainscoted part way on sides; the number of scholars on roll is 50, but the average is only 48, building is in very good condition, no special improvement to be made
Town of Onondaga, School District No 8	Windows at back and sides.	6	Yes	Yes	The number of scholars on the roll is 30, but the average is only 19, this building is in very good shape, is not very old and is warm, with very fair ventilation, the closet is in bad shape and I ordered it cleaned and doors put on, etc.
Town of Onondaga, School District No 9.	Windows at back and sides.	6	Yes	Yes	The number of scholars on the roll is 25, but the average is only 18; this building is in very good condition for a country school-house, it has been repaired, so it is comfortable.
Town of Onondaga, School District No. 10	Windows at sides	6	Yes	Yes	The number of scholars on the roll is 17, but the average is only 12; the benches and seats are old, and the building very loose and cold, it is open and the windows are loose; floor is old, needs a general overhauling and repairing; I ordered closet cleaned, needs a new one, the building is an old structure sealed
Town of Onondaga, School District No 11	Not given	6	Yes	Yes	The number of scholars on the roll is 36, but the average is only 25, there is virtually no ventilation and the floor is old, otherwise the building is in very good condition, but closet is in bad condition; I ordered it cleaned and repaired
Town of Onondaga, School District No. 12	Windows at sides and back	6	Yes	Yes	The number of scholars on the roll is 15, but the average is only 12; the building is an old structure; it is an open, loose building; the floor is open, windows loose and is very cold, needs general repairing; closet is old and in loose, bad condition.
Town of Onondaga, School District No 13	Windows are on all sides of building	6	Yes	Yes	The number of scholars on the roll is 33, but the average is only 22; the building is an old, loose, wooden structure sealed; the stove is old; windows are loose; the building is very old and loose; the floor is of wide boards with large cracks in them, needs general repairing; I ordered closet cleaned.
Town of Onondaga, School District No 14	Windows on sides and back.	6	Yes	Yes	The number of scholars on the roll is 24, but the average is only 11; the building is octagon in form; it is comparatively new and in very fair condition, but closet is in bad shape, but the trustee said he intended to tend to it as soon as possible.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Onondaga, School District No. 15.	Wooden....	1	2,907	27	107†	No drainage; earth closet.	By raising and lowering windows.	By stove.
Town of Onondaga, Navarino District No. 16.	Wooden...........	1	9,315	35	266†	No drainage; earth closet.	By raising windows and by transom.	By stove.
Town of Onondaga, School District No. 17.	Wooden...........	1	7,331	17	431†	No drainage; earth closet.	By raising and lowering windows, and by transom overhead.	By stove.
Town of Onondaga, School District No. 18.	Wooden...........	1	4,982	17	293†	No drainage; wooden earth closet.	By raising windows, and by transom overhead.	By stove.
Town of Onondaga, School District No. 19.	Wooden	1 { In winter. In summer.	22,572 22,572	10 5	2,257† 4,514†	No drainage; earth closet.	By raising and lowering windows.	By stove.
Town of Onondaga, School District No. 20.	Stone	1	4,158	14	297	No drainage; earth closets	By raising and lowering windows.	By stove.

PLACE.	Arrangement of seats.	School hours.	Recess.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Onondaga, School District No. 15.	Windows are on all sides of building.	6	Yes............	Yes..	The building is an old structure, plastered; the closet has been ordered cleaned; plaster is loose and off in places, rather cold, stove old, building is not large enough and needs repairing. I think, if it could be done without too great a distance for some, it would be well to unite with other districts. Closet needs repairing if left as at present, a separate district. Scholars have desks, but chairs are used for seats.
Town of Onondaga, Navarino District No. 16.	Windows at sides and back.	6	Yes....... ..	Yes ..	The building is in fair condition, except that there is very poor ventilation as windows are high, causing a sort of stagnation of air in lower part of room and nothing extra for circulation in upper part of room. The closet needs cleaning; I ordered it cleaned.
Town of Onondaga, School District No. 17.	Windows on sides and back.	6	Yes	Yes........... .	The building is plastered, but it is old and the plaster is loose, seats are old, etc. Closet needs cleaning; ordered done. This building needs some repairing, and should have new seats and new closets; the building is rather cold, but has very good ventilation for the manner of ventilation.
Town of Onondaga, School District No. 18.	Windows on sides and back.	6	Yes	Yes...	The building is old, and rather open and cold; the closet has been ordered cleaned; the ventilation is poor. The building is an old wooden structure, with practically no ventilation, a very poor stove to heat with; walls are papered and plaster is off or loose in several places. Closet is in bad shape; needs a general overhauling and repairing.
Town of Onondaga, School District No. 19.	Windows at sides and back.	6	Yes...	Yes.....	The building is an old structure; the closet is old; the stove is old and in bad shape. The number of scholars attending is ten in winter and five in summer. I would think best to unite this district with others near, on account of so few attending, and the condition of building, as it needs repairing; the plaster is off in several places, and it is a very cold, open building; closet is in very bad condition.
Town of Onondaga, School District No. 20.	Windows at sides of seats.	6	Yes....	Yes..	(a)

(a) The number of scholars on roll is 16, but the average is only 14. The building is sealed on inside and plastered outside; the closet was cleaned recently; four of the windows are small; building needs some repairs, as there are some small cracks, caused by shrinking of timber it was sealed with, allowing a little air, and stove is old, not a good heater; door and windows rather loose; some of the plaster on outside broken off; there is also poor ventilation.

SANITARY CONDITIO. OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. each class room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Onondaga, South Onondaga, District No. 21.	Wooden..........	1	11,400	75	152	No drainage; vault closets	By raising and lowering windows and by transom above.	By stove.
Town of Onondaga, School District No. 22.	Stone..............	1	4,275	20	213†	No drainage; vault closet.	By raising and lowering windows.	By stove.
Town of Onondaga, School District No. 23.	Wooden...........	1	3,420	25	136†	No drainage; vault closet.	By raising and lowering windows.	By stove.
Town of Onondaga, School District No. 25.	Wooden...........	1	3,840	18	213†	No drainage; vault closet.	By raising and lowering windows.	By stove.
Town of Onondaga, School District No. 26.	Wooden..........	1	4,180	25	167†	No drainage; earth closet.	By raising and lowering windows.	By stove.
Town of Onondaga, School District No. 27.	Stone	1	4,104	25	164†	No drainage; vault closet.	By raising windows from bottom.	By stove.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Onondaga, South Onondaga, District No. 21.	Windows on sides and rear.	6	Yes	Not generally	The building is plastered; there is, besides the large class-room, a small room used for recitation which contains 4,892 cubic feet; the plaster is off in places overhead caused by a slight leak, but it is to be repaired, and the ceiling is to be sealed in place of plaster, when the school closes.
Town of Onondaga, School District No. 22.	Light on all sides of building.	6	Yes	Yes	The number of scholars on the roll is 37, but the average is only 20; this building has been somewhat improved by repair and is in very fair condition, except the windows are very loose and blinds not securely fastened, strong winds will slam them and break lights out of windows sometimes.
Town of Onondaga, School District No. 23.	Windows at sides and back.	6	Yes	Yes	The number of scholars on the roll is 32, but the average is only 25; the building is plastered; closet needs cleaning; I ordered it cleaned; There are no special suggestions except use of window board; for a country school is in very fair condition.
Town of Onondaga, School District No, 25.	Windows at sides and back.	6	Yes	Yes	The number of scholars on the roll is 22, but the average is only 18; the building is sealed overhead, and plastered the upper one-half of sides; the closet needs cleaning; the windows are loose so that pupils are exposed to draught liable to cause sickness; windows are also too high not giving good light on desks; floor is old and open, having plenty of air holes; I ordered closet cleaned.
Town of Onondaga, School District No. 26.	Windows at sides and back.	6	Yes	Yes	The number of scholars on the roll is 28, but the average is only 25; the building has plastered sides and ceiling; the closet is in a wooden building; the building is in fairly good condition for country school; needs a little patching where plaster is off, would also suggest the window board; closet is in very fair condition.
Town of Onondaga, School District No. 27.	Windows at sides and back.	6	Yes	Yes	(a)

(a) The number of scholars on the roll is 31, but the average is only 25; building has upper half of sides and ceiling plastered; it is very open and cold; the closet is old and hardly safe or fit to use; the stove is old; windows are loose; there is a large crack over door and no latch to the door; the plaster is broken off in places so light shows through where mortar is cracked off; is very cold; woodshed is in front of door, and that in front a mud-hole. Other conditions endangering health of scholars; seats too high for small children; the side walls bulge some in two or three places; would not like to recommend the building but think it could be very much improved by a new one.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Hudson, District No. 1...	Brick..	5	10,908⅙ 5,524¾ 5,086	67 40 47	168 138 108	Drainage, tile drains to sewers; closets have vaults; drained.	School No. 2 is ventilated by shafts in chimney, other schools by windows.	School No. 2 is heated by a hot air furnace; Nos. 1 and 3 are heated by stoves.
Hudson, District No. 2...		12	6,435 5,786⅔ 5,786⅔	81 40 40	79 145 145			
Hudson, District No. 3...	....	6	7,024† 6,298	51 42	138 150			
Town of Castleton, Richmond Co., Dist. School No. 1.	Frame	2	11,016 7,128	40 60	275† 118†	Closets are 50 feet from the building, and have shallow cesspools.	Both rooms are ventilated by windows and doors; and the larger room has, in addition, two well protected ventilat'rs (8x12); no other effort at ventilation is made.	By stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Hudson, District No. 1...	The light is mostly from sides.	9 to 12 A. M.; 1.30 to 4 P. M., 5½ h.	Yes.....	Yes.............	(*a*)
Town of Castleton, Richmond Co., Dist. School No. 1.	(*b*)	None given	Yes.........	Yes..	(*c*)

(*a*) There are three school-houses in district; new one erecting. The dimensions of all the rooms are not given, nor the number of scholars in each; there is a cutting from the health officer's report of 1885 to the local Board of Health, appended to the report sent on the condition of the public schools, but it gives the cubic dimensions, average number of scholars and average air space *per capita* to each room of the primary rooms only, so that the rooms here tabulated, three in School No. 1, three in School No. 2, and two in School No. 3, are all primary: the cubic dimensions, average number of scholars, and average air space *per capita* to each of the other rooms not being given. The report to the local board of 1885, also says, many complaints have been made to me of overcrowding in our public schools from want of space; at the end of the school session in June, I obtained a measurement of certain rooms in the three buildings with the attendance in each for the month of May (the number of cubic feet of air space to each scholar was then found), allowing 300 cubic feet as the minimum for each scholar; it is easily seen that but two rooms have half that minimum space, and in all the other instances even less is alloted to each pupil. Some of the defects I am happy to say have been remedied; it seems to me, therefore, that when the Board of Education ask the taxpayers of our city for an increased allowance wherewith to enlarge their capacities for the healtful teaching of our growing youth, the people should not hesitate to demand that they be allowed what they need; a sound mind cannot be built up in a diseased body, the hygiene of the one is as essential as the other to the development of each.

(*b*) The larger room has 3 windows on the north, 2 on east and west and 1 south: the scholars face the east and have the principal light from the back (W) and from the left (N); the one window on the south being near one corner of the room would afford very little light from that side, the right; the smaller room is lighted from 3 sides.

(*c*) The building is one-story high with pitched shingle roof, and is located in the centre of an acre lot; the ground slopes towards the west and is well drained; the floor of the building is from 3 inches to 3 feet from the ground with a small cellar under part of it, but not in any way protected from effluvia arising from the soil; the windows of the larger room are each 2.6x6, and 3 feet from floor and ceiling, the light comparing to floor space is as 1 to 6; the desks for two each are somewhat primitive; each child has 23 square feet of floor space; in the smaller room the desks are older, and only 10 square feet of floor space is allowed to each child; as the air is only spairingly renewed it is offensive, and the room generally deficient; the out-houses are those generally used in the country; the children have 15 minutes recess between fore and afternoon sessions. Suggestions: As a new school building is already in contemplation only temporary improvements are suggested. Heating: The stoves should be supplied with jackets, and fresh air inlets from outside by means of cold air boxes with movable slides; the stove pipes continued through chimney and chimneys used as ventilators for egress of foul air. Light: Transoms above the windows to left and back (N. W.) of children, reaching to ceiling to give more light where it is required; additional recess of 10 minutes between morning sessions. If a new school-house is to be built, the plans should be submitted to the board for approval or correction.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Castleton, Richmond Co., Dist School No. 2, West New Brighton (northern or old building).	Brick	6	9,190	34 1-6	258†	Privy vault	(*a*)	By stoves ....
Town of Castleton, Richmond Co., Dist. School No. 2, West New Brighton (primary building.	Brick	8	8,624	36¾	235†	Privy vault	(*b*)	(*c*)

(*a*) In room No. 4, although under ground, no effort at ventilation is made; in room No. 2 six well protected ventilators, three feet from the ceiling, carry the foul air through brick shafts six feet long to the outside; in rooms Nos. 5 and 6, cylinders fifteen inches in diameter, terminating in the attic, are supposed to ventilate the rooms, while in rooms Nos. 1 and 3, ventilators in the ceiling 12x15 lead into the same attic; the attic itself has two ventilators 3x3x6, but for some reason or other both are hermetically sealed; the ventilator is almost nugatory, even where attempted; in the most crowded room (No. 3) it is positively "*nihil*."

(*b*) Six ventilating shafts from each room, with gratings two feet from ceiling, are suffered to carry the foul air to the outside, but being placed directly over the windows, which have to be lowered to admit the fresh air, are of little purpose; the new additions have an elaborate ventilator in each room, but as the shaft attached is only 3-15 inches, terminating under the roof of the building, they are architectural abortions.

(*c*) A compound air and steam furnace with fresh air box is already in operation in the new building, but not completed in the older part, and constituting a great improvement, although indirect heat would have been cheaper and would, in my opinion, have answered a better purpose.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*)

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Castleton, Richmond Co., Dist. School No. 2, West New Brighton (northern or old building).	(*a*)	Not given.	Not given......	Not given.......	(*b*)
Town of Castleton, Richmond Co., Dist. School No. 2, West New Brighton (primary building).	Not definitely stated. (See Remarks.)	Not given.......	Not given.......	Not given.......	(*c*)

(*a*) The seats in the rooms on the first floor, with one exception, are so arranged as to receive light from the left and back, and face a dead wall; the school-rooms on the second floor are similarly lighted.

(*b*) The building stands in an acre and a-half plot, and is a two story and attic structure; the first floor is from eighteen inches to three feet above ground, except the rear extension, which is from a foot to eighteen inches below the rising surface; some few bricks have been removed from the surface wall of the foundation to admit light and air, but not enough for the purpose of establishing circulation of air, or even to secure an outlet for the exhalations from the uneven and damp surface; the stairs leading to the second story are narrow and cramped, and in case of fire egress would be almost impossible; there are five school-rooms on the lower floor, but only four of them in use; they have 3x5 windows, three feet from the floor and ceiling; the desks throughout are old and uncomfortable, and evidently out of date; there are two school-rooms on the second floor; all the rooms are heated by stoves, only one of these receiving a supply of fresh air, and all insufficient for comfort and health; the cubic space of breathing air is, in one-half the rooms, below the lowest allowance, but with no effort of ventilation the sanitary condition of the different rooms is absolutely bad, as there is no provision for the inlet of good and the outlet of bad air; the heating method is defective and insufficient; the heat is too intense for those near the stove and it is cold for those near the wall; the light is too low for those in the middle of the room, and not in the proper direction for those near the wall. Recommendations and suggestions: Light — Transoms above the windows to the left and rear of children, reaching to the ceiling. Heating — Entire change of method of heating, and, if practicable, jackets surrounding stoves, with inlet of fresh air at the base; additional similarly constructed stoves where necessary. Ventilation — Clearing of existing shafts; ventilators in attic and every facility given for outlet of four air. The use of room No. 4 should be absolutely prohibited, as its floor is bedded in the ground, and lower than the privy vault, only thirty feet from and above the room, besides being badly lighted and not at all ventilated; in fact the entire building needs remodeling and changing to make it conformable to modern requirements in the most necessary and beneficial of public blessings.

(*c*) This building is north of the old school-house on the same plot of ground, and is of more recent date, with additions only lately finished; this also is a two story and peaked roof brick building; in the additions only have we a cellar six feet high, containing the compound air and steam furnace, but neither this nor the ground underneath the older building is cemented, the beams of the first floor resting on dwarf walls two to four feet high; this space is only sparingly ventilated and now being deepened to receive an additional furnace, should be leveled and concreted throughout; modern school furniture and arched windows reaching within two feet of ceiling give these rooms a better and brighter appearance, and the southern rooms have an abundance of light in the right direction, while the middle rooms are not so perfect, and in both, above and below, the seats facing the wrong way; a large hall separates the new additions from the older building, giving egress to the middle rooms to either staircase; the four new school-rooms separated by movable glass doors, and furnished in modern style; with the hard finished trimmings and white walls, and windows reaching nearly to the ceiling, give evidence of progress, though not yet perfect, nor in full harmony with modern school architecture; outside fire escape stairs add to the security of the building. Light is received through arched windows, which are always inappropriate; they rob the child of the best portion of light, and in some rooms the arrangement of the seats is such as to place the child in its own light. Suggestions: Beyond change of seats to have the light from the left and back, the lowering and cementing of cellar, direct ventilation in proportion to number of scholars, are all that could be suggested as necessary improvements, and as even here the amount of cubic space of air is below the normal standard, additional accommodations; the out-houses are only 32-60 feet from the school building, with shallow vaults and cramped seats, the very school for indecency and vice; it is impossible for a child to use them, and as for privacy it is out of the question; entire remodeling of the same is absolutely required.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Town of Castleton, Richmond Co., Dist. School No. 3.	Brick	14	9,155 5-7	41 3-7	250†	Drainage good; closets are four in number and are about fifty feet from and in the rear of the buildi'g; simple wood'n structures built over a deep vault.	(*a*)	The entire b'ld'g is supplied with direct steam heat, ample and under full control.
Town of Castleton, Richmond Co., Dist. School No. 4.	Brick	6	6,794⅚	42⅚	179	(*b*)	The upper floor only is supplied with direct ventilators, these are 12x16 in each alcove room; the windows and doors are the only other means for change of air.	By furnaces
Grace School, Syracuse	Wooden	3	11,353⅓	103	115†	Outside closets unconnected with sewer.	Ventilated by shafts, but little use.	Room No. 1 is heated by stove and furnace; room No. 2 by furnace; room No. 3 by stove.
Franklin School, Syracuse	Brick	5	19,213 1-5	146 1-5	131†	Outside closets unconnected with sewer.	Ventilation in one room is by windows and doors; the rest have ventilators.	Heated by steam.
Salina School, Syracuse..	Brick	5	18,959 1-5	116 4-5	162†	Outside vaults unconnected with sewer.	By shafts	Heated by stoves.

(*a*) In each school-room there are four (6x10) ventilators two feet from the floor which are intended to carry the foul air through chimneys in the wall to the attic, and thence through four other ventilators (12x10) to the outer air, but as the flues are irregular and rough, provided with sliding shutters, and nothing to create a draught upwards, they are almost useless; the inlet of fresh air is exclusively through doors and windows.

(*b*) The water closets are directly in the rear and attached to the building, they are the separate latrine closets of galvanized iron, the plunger under lock and key for the use of the janitor, all emptying now into the brook seventy-five feet * om the school building; there are two other water closets in basement for teachers and employes, both supplied with hoppers and in good sanitary condition.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Town of Castleton, Richmond Co., Dist. School No. 3.	Not definitely stated (see remarks).	9 to 12, 1 to 3.... 5	Yes; (one recess of 20 minutes in the morning).	Yes..........	(a)
Town of Castleton, Richmond Co., Dist. School No. 4.	Not definitely stated (see remarks).	9 to 12, 1 to 3.... 5	Yes; (20 minutes recess in the morning).	Yes..............	(b)
Grace School, Syracuse...	Light in all rooms is at right and left of seats.	....	Yes.............	Yes.	None given.
Franklin School, Syracuse	Light in three of the rooms is at left and rear of seats; in other two rooms from left only.	....	Yes.............	Yes...........	None given.
Salina School, Syracuse..	Light in 3 of the rooms is at right and left of seats; in other 2 rooms from left and rear.	....	Yes.............	Yes.............	None given.

(a) The building occupies the highest eminence in the village; it is a fine three-story brick building 76x60 with three wings attached to the rear, 36x42 feet deep; the ground, 100x100, sloping to the east and west with a substratum of porous soapstone offering every advantage of thorough drainage, and being central is one of the best sites that could have been selected; the basement wherever below ground has been surrounded by areaways three feet wide; ample provision is everywhere made for cloak-rooms and library, and hard finished walls, polished oak floor and trimmings bear ample evidence that no money has been spared to make the building as perfect as could be desired; the rounded windows reaching scarcely within two feet of the ceiling, showing, however, that good judgment was sacrificed to fancy and architectural beauty; on the first floor there are only four rooms in use for the smallest children, and these, as usual in primary departments overcrowded; and though all the appointments are modern, not the best use is made of the proffered facilities; the second floor is fully occupied, and even in the attic a school room extemporized for the use of the largest children; rooms 8 and 10 having additional transom windows giving the light from above, and the children being so placed as to secure it from the back and left are models of construction. Suggestions: Rearrangement of seats in school room where children now face the light so that it shall be from the back or left of children; where children face a white wall the same should be painted buff or blue. Ventilation by aspiration: The different ventilating shafts should be extended to one or more center shafts with fan aspirating air from the rooms; water closets should be so arranged that a partition projecting six to ten inches would separate the frequenters from each other without granting absolute privacy.

(b) The building is a one and a-half story, basement and mansard roof, brick building, with a frontage of 100 feet, and 100 feet deep; the furnaces are bricked in, with cold air supply from the north, all in good order; the first floor is used for the girl's department, the second for the boy's department; the walls throughout are hard finished, in the second story slanting to correspond with the mansard roof above, the woodwork is of oak, with swinging doors; the windows on the lower floor are square, reaching nearly to the ceiling, but are arched and much lower on the upper floor; all supplied with movable shades besides inside shutters; the light is good, each room being supplied with six windows, except the middle rooms, which have only four, front and back of scholars; the seats are comfortable but occupying every available space, even the upper halls. Suggestions. Where halls have to be used as school rooms, and the amount of cubic air for each scholar is less than 100 with inadequate ventilation, enlarged accommodations are indispensable. Light: Arched projecting windows two feet from the ceiling, altogether only thirteen feet high, are insufficient both for light and air; windows should be squared and carried to ceiling in second story; separate cloak rooms should take the place of pegs for the hanging up of clothes in the overcrowded school-room; children under ten should have recess of ten minutes every hour; the white walls should be painted buff or blue; the lowest average air space *per capita* in any room is 108 cubic feet, and in this room are the smallest girls; the next lowest allowance is 114 cubic feet, and in this room are the smallest boys; the average air space *per capita* in halls used as school rooms is not given.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation	Heating.
Irving School, Syracuse..	Brick	8	8, 521½	53⅝	158†	Vaults outside connected with sewer.	By doors & windows.	Heated by stoves.
High School, Syracuse ...	Brick	17	47, 800	261½	190†	Water closets inside connected with sewer.	Has four large shafts which do not work; reliance is on doors and windows.	Heated by steam.
Adams School, Syracuse..	Wooden	5	8, 346	58 4-5	141†	Outside vault connected with sewer.	By shafts	Heated by stove.
Clinton School, Syracuse.	Brick	10	13, 888	124¼	111†	Outside vault connected with sewer.	Two upper rooms have each a shaft; the rest are ventilated by windows only.	Heated by stove.
Genesee School, Syracuse.	Brick	10	7, 841 2-5	57 1-5	137†	Outside vault connected with sewer.	By doors and windows only.	Two rooms are heated by stove and furnace, six are heated by furnace and two are heated by stoves.
Jefferson School, Syracuse	Brick	8	9, 665 2-5	58 1-5	166†	Outside vault connected with sewer.	By doors and windows only.	Heated by stoves.

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Irving School, Syracuse..	Two rooms have light at left of seats, two have light at right, one has light from left and rear, two have light from right and rear and one has light from rear only	....	Yes............	Yes.............	None given.
High School, Syracuse ...	One room is lighted at right and left of seats, four at left, five at right and rear, four at left and rear and two at right only.	8.30 to 1.00...... 4½	Yes...........	Yes.. ...	The number of rooms in the High School is given as seventeen, but the average number of scholars is only given for two rooms, so that the average air space *per capita* had to be calculated from the data given for these two rooms; the arrangement of seats with reference to light is given only for sixteen rooms.
Adams School, Syracuse..	Two rooms have light from right and left of seats, two have light from right, left and rear and one has light from rear only.	....	Yes..	Yes...........	None given.
Clinton School, Syracuse	Two rooms have light at right and left of seats, three rooms have light at rear only, three have light at right only and two have light from right and rear.	....	Yes...........	Yes............	The number of rooms in Clinton school is given as ten, but the average number of scholars is only given for four rooms, so that the average air space *per capita* had to be calculated from the data given for these four rooms.
Genesee School, Syracuse.	Three rooms have light at left and rear of seats, three have light from right and left, two have light from right and rear and two have light from left only.	....	Yes..	Yes.............	None given.
Jefferson School, Syracuse	Two rooms have light at right and rear of seats, three have light from left and rear and three have light from left alone.	....	Yes.............	Yes......	The number of rooms in Jefferson School is given as eight, but the average number of scholars is only given for five rooms, so that the average air space *per capita* had to be calculated from the data given for these five rooms.

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.	Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space percapita.	Closets and drainage.	Ventilation.	Heating.
Madison School, Syracuse	Brick	13	9,650†	58†	165†	Outside vault connected with sewer.	All rooms are ventilated by two heater shafts 2½ feet in diameter.	Heated by furnace.
May School, Syracuse....	Brick	11	8,372†	52†	158†	Outside vault unconnected with sewer.	By shafts	Heated by furnace.
Montgomery School, Syracuse.	Brick	11	7,495†	57†	130†	Outside vault unconnected with sewer.	By shafts	By stoves.
Prescott School, Syracuse.	Brick	12	10,278⅙	56	183†	Water-closets inside connected with sewer.	Each room is ventilated by a separate shaft 12x14 inches.	By furnace.
Putnam School, Syracuse.	Brick	14	8,182†	48†	169†	Outside vaults connected with sewer.	Each room is ventilated by a shaft 12x18 inches.	8 rooms are heated by stoves, and 6 rooms are heated by furnace.
Townsend School, Syracuse.	Brick		8,215†	47†	173†	Outside vault unconnected with sewer.	The rooms that are heated by furnaces are ventilated by shafts; the rest are ventilated by windows only.	(a)

(a) Seven rooms are heated by stoves, one room is heated by furnace and one room is heated by stove and furnace

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc.
Madison School, Syracuse	Nine rooms have light at left and rear of seats and four rooms have light at left only.	....	Yes............	Yes..........	None given.
May School, Syracuse....	Seven rooms have light at left and rear of seats, two have light from right, left and rear and two have light from left only.	....	Yes............	Yes........	None given.
Montgomery School, Syracuse.	Three rooms have light at left and rear of seats; 3 have light from right and rear, 1 has light from rear alone, 2 have light from right alone, and 2 have light from left alone.	(a)	Yes..........	Yes............	None given.
Prescott School, Syracuse.	Eight rooms have light at left of seats, 2 rooms have light at right of seats, and 2 rooms have light from rear of seats only.	(a)	Yes............	Yes............	None given.
Putnam School, Syracuse.	Ten rooms have light at left and rear of seats, and 4 rooms have light at left of seats only.		Yes............	Yes............	None given.
Townsend School, Syracuse.	Three rooms have light at right, left and rear of seats, 4 rooms have light at right and left of seats, 2 rooms have light at left and rear of seats, and one room has light at left of seats only.	(a)	Yes............	Yes............	None given.

(a) **The duration of school hours in the primary schools is, 9 to 12 and 1.30 to 3.30, 5 hours; junior and senior schools, 9 to 12 and 1.30 to 3.45, 5¼ hours.**

SANITARY CONDITION OF SCHOOL-HOUSES—(*Continued*).

PLACE.	Character of building.		Number of class-rooms.	Average cubic dim. of each class-room.	Average number of pupils in each.	Average air space per capita.	Closets and drainage.	Ventilation.	Heating.
Seymour School, Syracuse	Brick		12	13,346⅔	71†	186†	Outside closets connected with sewer.	First 4 rooms are ventilated by separate flues & open grates; the other rooms are ventilated by flues or shafts only.	By steam.
Elmira..................	All brick..	No. 1	Study hall 7 class-rooms.	97,843.2	294	332.8	Two schools have sewer connections; the rest have privy vault system; good drainage, etc.	Ruttan-Smead apparatus in Nos. 1, 2, and 3; others by ventilating shafts.	No. 1 by Ruttan-Smead, also Acade'y; No. 4 by steam, others by furnace.
				9,784.5†	47†	205.6			
		No. 2	6	10,518.75	43⅓	242.7†			
		No. 3	7	8,674†	54†	158†			
		No. 4	Study hall 5 class-rooms.	73,728	320	230†			
				12,564	60†	208†			
		No. 5	Study hall 6 class-rooms.	101,250	280	361†			
				13,770	40†	342†			
		No. 6	2	11,088	36	308			
		Prim.	4	21,600	50	432			

SANITARY CONDITION OF SCHOOL-HOUSES — (*Continued*).

PLACE.	Arrangement of seats.	School hours.	Recesses.	Are children allowed to go to closet in school hours.	Remarks, etc
Seymour School, Syracuse	Two rooms have light at right and rear of seats, 6 rooms have light at left and rear of seats, and 4 rooms have light from left of seats only.	(*a*)	Yes.............	Yes.......... ..	(*b*)
Elmira........	Light from the left and rear.	9 A. M. to 3.30 P. M., with noon intermission of 1½ hrs., 5 hrs.	Yes; except at Academy which closes at 2.30 P. M., with nooning of 45 min.	Yes.............	(*c*)

(*a*) The duration of school hours in the primary school is, 9 to 12 and 1.30 to 3.30, 5 hours; junior and senior schools, 9 to 12 and 1.30 to 3.45, 5¼ hours.

(*b*) Our greatest failure comes from neglecting to provide proper ventilation; the school-houses are built on the plan of saving fuel instead of furnishing fresh air and abundance of it, and while we have improved in lighting, heating, and otherwise adding to our comfort, we have not equally progressed in giving good, wholesome air to our pupils; this has come largely from the fact that the subject of ventilation has not been well understood, and as it is becoming better known to the few, the majority do not realize its importance sufficiently to provide the necessary funds for carrying out plans by which it can be done; give to our children good, pure air and enough of it to work in, and the amount of work required by the teacher of to-day, with the better knowledge of what constitutes the true end of teaching and in what consists education, and I shall not fear for the nervousness of pupils; it is not work that breaks one down but improper physical conditions and undue mental excitements. (Extract from Superintendent's report for past year 1886.) Seymour is the only ventilated school in the city; where stoves and steam are used the condition is truly deplorable.

(*c*) I would recommend the Ruttan-Smead heating and ventilating system in all departments; our school buildings in Elmira are of recent build and are handsome, well ventilated structures; the only complaint is in heating them; the Ruttan-Smead, where in use, acts perfectly in this regard. The report says there are 8 schools, but separate reports are given for only 7; the cubic contents of the study hall in School No. 2, 54,600 cubic feet, but the average number of scholars in it is not given; there is also in this school a new room on the first floor containing 21,996 cubic feet, and a new room on the second floor containing 20.496 cubic feet, and another room referred to as No. 0, and the average number of scholars in none of these rooms is given; the school has also 8 recitation rooms; 4 in rear each containg 6,650 cubic feet, and having 42 as the average number of scholars, which gives an average air space of 158⅓ cubic feet; and 4 in front each containing 9,000 cubic feet; the average number of scholars in each is 42, which gives an average air space *per capita* of 214 2-7 cubic feet. School No. 3 has, in addition to the class-rooms, 5 recitation rooms, 4 contain 6,650 cubic feet each, and have as the average number of scholars 49, which gives an average air space *per capita* of 135 5-7 cubic feet; and one contains 8,400 cubic feet, with 31 as the average number of scholars, which gives an average air space *per capita* of 270 30-31 cubic feet. School No. 4 has 5 recitation rooms, besides the study hall and class-rooms; 3 of these recitation rooms contain 11,340 cubic feet each, with the average number of scholars in each as 80, which gives an average air space *per capita* of 141¾ cubic feet; and 2 contain 9,000 cubic feet each and have 50 as the average number of scholars, which gives 180 cubic feet as the average air space *per capita*. School No. 5 has, besides the study hall and 6 class-rooms, 5 recitation rooms, each containing 9,000 cubic feet, with the average number of scholars as 41, which gives an average air space *per capita* of 219 21-41 cubic feet.

NAME	DATE DUE